Filed June 28, 2022

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.

Petitioner,

v.

MASIMO CORPORATION,

Patent Owner.

IPR2020-01713
U.S. Patent 10,624,564

PATENT OWNER'S NOTICE OF APPEAL TO THE U.S. COURT OF APPEALS FOR THE FEDERAL CIRCUIT

Pursuant to 28 U.S.C. § 1295(a)(4)(A), 35 U.S.C. §§ 141(c), 142, and 319, 37 C.F.R. §§ 90.2(a) and 90.3, and Rule 4(a) of the Federal Rules of Appellate Procedure, Patent Owner Masimo Corporation ("Masimo") hereby appeals to the United States Court of Appeals for the Federal Circuit from the Judgment – Final Written Decision (Paper 31) entered on May 2, 2022 (Attachment A) and from all underlying orders, decisions, rulings, and opinions that are adverse to Masimo related thereto and included therein, including those within the Decision Granting Institution of *Inter Partes* Review, entered May 5, 2021 (Paper 7). Masimo appeals the Patent Trial and Appeal Board's determination that claims 1-30 of U.S. Patent 10,624,564 are unpatentable, and all other findings and determinations, including but not limited to claim construction, as well as all other issues decided adverse to Masimo's position or as to which Masimo is dissatisfied in IPR2020-01713 involving Patent 10,624,564.

Masimo is concurrently providing true and correct copies of this Notice of Appeal, along with the required fees, to the Director of the United States Patent and Trademark Office and the Clerk of the United States Court of Appeals for the Federal Circuit.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: June 28, 2022

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ATTACHMENT A

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571-272-7822

Paper 31
Entered: May 2, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

MASIMO CORPORATION,
Patent Owner.

IPR2020-01713
Patent 10,624,564 B1

Before JOSIAH C. COCKS, ROBERT L. KINDER, and AMANDA F. WIEKER, *Administrative Patent Judges.*

KINDER, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

A. Background

Apple Inc. ("Petitioner") filed a Petition requesting an *inter partes* review of claims 1–30 ("challenged claims") of U.S. Patent No. 10,624,564 B1 (Ex. 1001, "the '564 patent"). Paper 2 ("Pet."). Masimo Corporation ("Patent Owner") waived filing a Preliminary Response. Paper 6. We instituted an *inter partes* review of all challenged claims 1–30 on all asserted grounds of unpatentability, pursuant to 35 U.S.C. § 314. Paper 7 ("Inst. Dec.").

After institution, Patent Owner filed a Response (Paper 14, "PO Resp.") to the Petition, Petitioner filed a Reply (Paper 18, "Pet. Reply"), and Patent Owner filed a Sur-reply (Paper 21, "Sur-reply"). An oral hearing was held on February 9, 2022, and a transcript of the hearing is included in the record. Paper 30 ("Tr.").

We issue this Final Written Decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons set forth below, Petitioner has met its burden of showing, by a preponderance of the evidence, that challenged claims 1–30 of the '564 patent are unpatentable.

B. Related Proceedings

Masimo Corporation v. Apple Inc., Civil Action No. 8:20-cv-00048 (C.D. Cal.) (filed Jan. 9, 2020);

Apple Inc. v. Masimo Corporation, IPR2020-01520 (PTAB Aug. 31, 2020) (challenging claims of U.S. Patent No. 10,258,265 B1);

Apple Inc. v. Masimo Corporation, IPR2020-01521 (PTAB Sept. 2, 2020) (challenging claims of U.S. Patent No. 10,292,628 B1);

Apple Inc. v. Masimo Corporation, IPR2020-01523 (PTAB Sept. 9, 2020) (challenging claims of U.S. Patent No. 8,457,703 B2);

Apple Inc. v. Masimo Corporation, IPR2020-01524 (PTAB Aug. 31, 2020) (challenging claims of U.S. Patent No. 10,433,776 B2);

Apple Inc. v. Masimo Corporation, IPR2020-01526 (PTAB Aug. 31, 2020) (challenging claims of U.S. Patent No. 6,771,994 B2);

Apple Inc. v. Masimo Corporation, IPR2020-01536 (PTAB Aug. 31, 2020) (challenging claims 1–29 of U.S. Patent No. 10,588,553 B2);

Apple Inc. v. Masimo Corporation, IPR2020-01537 (PTAB Aug. 31, 2020) (challenging claims of U.S. Patent No. 10,588,553 B2);

Apple Inc. v. Masimo Corporation, IPR2020-01538 (PTAB Sept. 2, 2020) (challenging claims of U.S. Patent No. 10,588,554 B2);

Apple Inc. v. Masimo Corporation, IPR2020-01539 (PTAB Sept. 2, 2020) (challenging claims of U.S. Patent No. 10,588,554 B2);

Apple Inc. v. Masimo Corporation, IPR2020-01714 (PTAB Sept. 30, 2020) (challenging claims of U.S. Patent No. 10,631,765 B1);

Apple Inc. v. Masimo Corporation, IPR2020-01715 (PTAB Sept. 30, 2020) (challenging claims of U.S. Patent No. 10,631,765 B1);

Apple Inc. v. Masimo Corporation, IPR2020-01716 (PTAB Sept. 30, 2020) (challenging claims of U.S. Patent No. 10,702,194 B1);

Apple Inc. v. Masimo Corporation, IPR2020-01722 (PTAB Oct. 2, 2020) (challenging claims of U.S. Patent No. 10,470,695 B2);

Apple Inc. v. Masimo Corporation, IPR2020-01723 (PTAB Oct. 2, 2020) (challenging claims of U.S. Patent No. 10,470,695 B2);

Apple Inc. v. Masimo Corporation, IPR2020-01733 (PTAB Sept. 30, 2020) (challenging claims of U.S. Patent No. 10,702,195 B1); and

Apple Inc. v. Masimo Corporation, IPR2020-01737 (PTAB Sept. 30, 2020) (challenging claims of U.S. Patent No. 10,709,366 B1).
Pet. 3; Paper 3, 1, 3–4.

Patent Owner further identifies certain pending patent applications, as well as other issued and abandoned applications, that claim priority to, or share a priority claim with, the '564 patent. Paper 3, 1–2.

C. The '564 Patent

The '564 patent is titled "Multi-Stream Data Collection System for Noninvasive Measurement of Blood Constituents," and issued on April 21, 2020, from U.S. Patent Application No. 16/725,292, filed December 23, 2019. Ex. 1001, codes (21), (22), (45), (54). The '564 patent claims priority through a series of continuation and continuation-in-part applications to Provisional Application Nos. 61/086,060, 61/086,108, 61/086,063, and 61/086,057, each filed on August 4, 2008, as well as 61/091,732, filed on August 25, 2008, and 61/078,228 and 61/078,207, both filed on July 3, 2008. *Id.* at codes (60), (63).

The '564 patent discloses a two-part data collection system including a noninvasive sensor that communicates with a patient monitor. *Id.* at 2:47–51. The sensor includes a sensor housing, an optical source, and several photodetectors, and is used to measure a blood constituent or analyte, e.g., oxygen or glucose. *Id.* at 2:38–46, 3:4–6. The patient monitor includes a display and a network interface for communicating with a handheld computing device. *Id.* at 2:54–57.

Figure 1 of the ’564 patent is reproduced below.

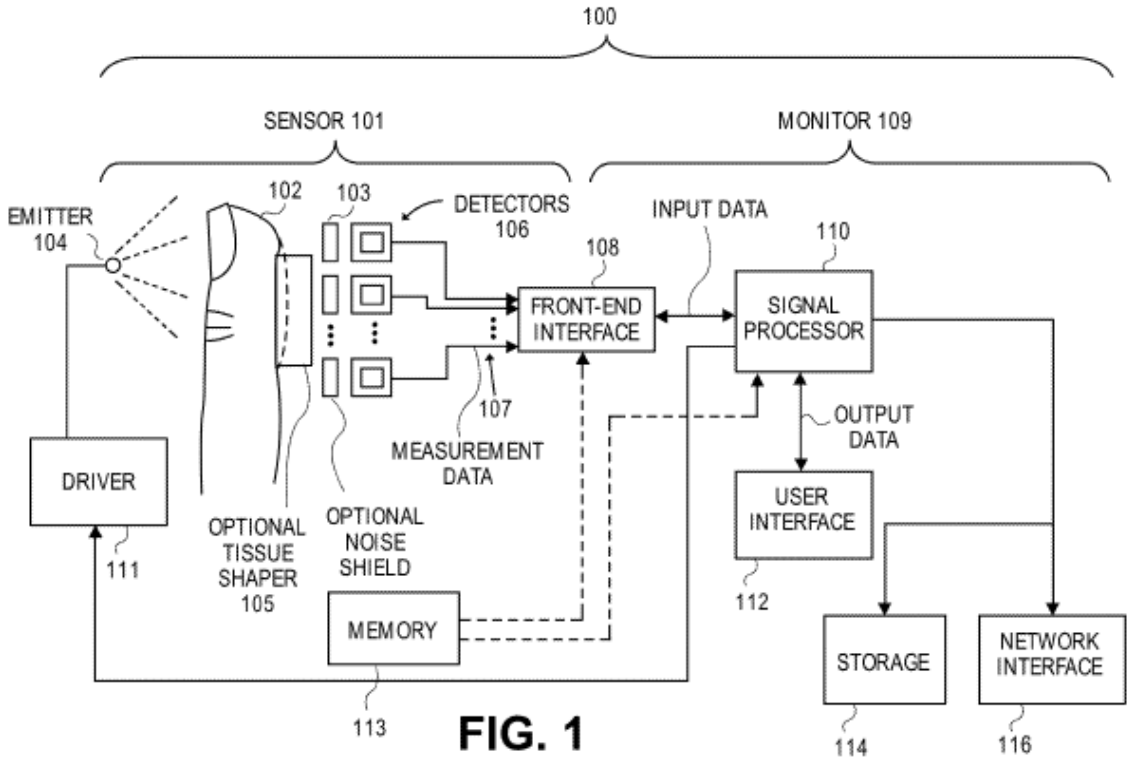


FIG. 1

Figure 1 illustrates a block diagram of data collection system 100 including sensor 101 and monitor 109. *Id.* at 11:56–67. Sensor 101 includes emitter 104 and detectors 106. *Id.* at 12:1–5. Emitter 104 emits light that is attenuated or reflected by the patient’s tissue at measurement site 102. *Id.* at 14:11–16. Detectors 106 capture and measure the light attenuated or reflected from the tissue. *Id.* In response to the measured light, detectors 106 output detector signal 107 to monitor 109 through front-end interface 108. *Id.* at 14:16–19, 36–42. Sensor 101 also may include tissue shaper 105, which may be in the form of a convex surface that: (1) reduces the thickness of the patient’s measurement site; and (2) provides more surface area from which light can be detected. *Id.* at 11:7–23.

Monitor 109 includes signal processor 110 and user interface 112. *Id.* at 15:27–29. “[S]ignal processor 110 includes processing logic that

determines measurements for desired analytes . . . based on the signals received from the detectors 106." *Id.* at 15:32–35. User interface 112 presents the measurements to a user on a display, e.g., a touch-screen display. *Id.* at 15:57–61. In response to user input or device orientation, user interface 112 can "reorient its display indicia." *Id.* at 15:63–67. The monitor may be connected to storage device 114 and network interface 116. *Id.* at 16:4–22. In some embodiments, the monitor, including the display, is attached to the patient by a strap. *Id.* at 17:56–59, 18:16–19.

The '564 patent describes various examples of sensor devices. Figures 14D and 14F, reproduced below, illustrate sensor devices.

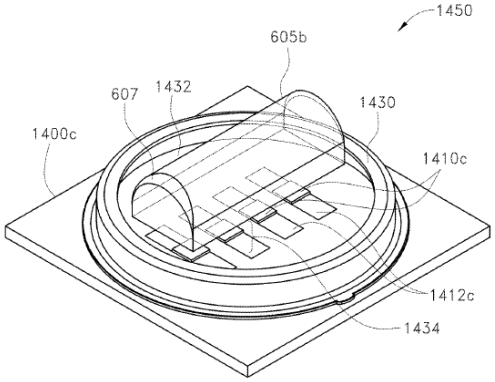


FIG. 14D

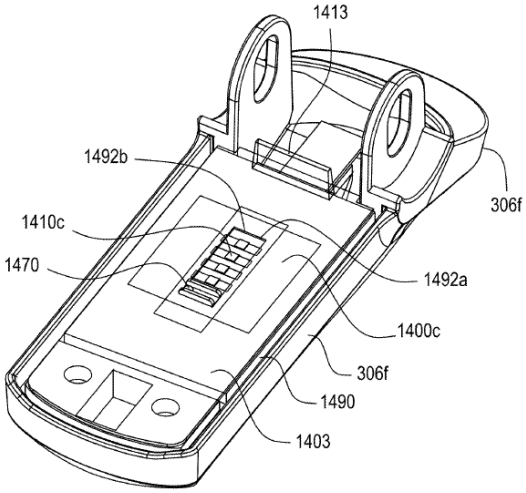


FIG. 14F

Figure 14D illustrates a detector submount and Figure 14F illustrates portions of a detector shell. *Id.* at 6:54–57. As shown in Figure 14D, multiple detectors 1410c are located within housing 1430 and under transparent cover 1432, on which protrusion 605b is disposed. *Id.* at 36:40–47. Figure 14F illustrates detector shell 306f including detectors 1410c on substrate 1400c. *Id.* at 37:20–21. In some embodiments, the detector shell includes walls to separate individual photodiode arrays and to "prevent or

reduce mixing of light signals." *Id.* at 22:46–53. Substrate 1400c is enclosed by shielding enclosure 1490 and noise shield 1403, which include window 1492a and window 1492b, respectively, placed above detectors 1410c. *Id.* at 22:20–36.

Figures 4A and 4B, reproduced below, illustrate an alternative example of a tissue contact area of a sensor device.

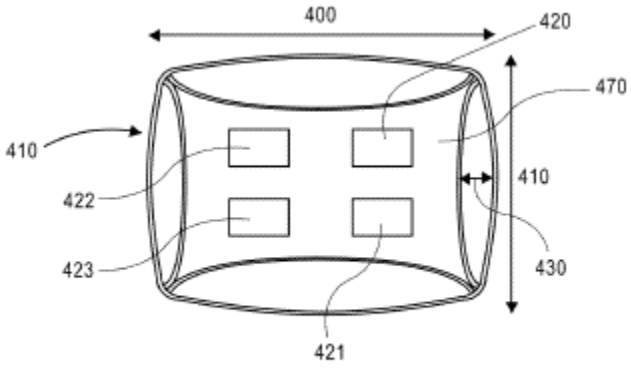


FIG. 4A

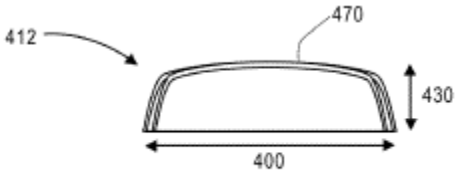


FIG. 4B

Figures 4A and 4B illustrate arrangements of protrusion 405 including measurement site contact area 470. *Id.* at 23:30–36. "[M]easurement site contact area 470 can include a surface that molds body tissue of a measurement site." *Id.* "For example, the measurement site contact area 470 can be generally curved and/or convex with respect to the measurement site." *Id.* at 23:53–55. The measurement site contact area includes windows 420–423 that "mimic or approximately mimic a configuration of, or even house, a plurality of detectors." *Id.* at 23:61–24:8.

D. Illustrative Claim

Of the challenged claims, claim 1 is independent. Claim 1 is illustrative and is reproduced below.

> 1. [pre] A user-worn physiological measurement device comprising:

[a] one or more emitters configured to emit light into tissue of a user;

[b] at least four detectors arranged on a substrate;

[c] a cover comprising a protruding convex surface, wherein the protruding convex surface extends over all of the at least four detectors arranged on the substrate, wherein at least a portion of the protruding convex surface is rigid;

[d] one or more processors configured to: receive one or more signals from at least one of the at least four detectors, the one or more signals responsive to at least a physiological parameter of the user; and process the one or more signals to determine measurements of the physiological parameter;

[e] a network interface configured to communicate with a mobile phone;

[f] a touch-screen display configured to provide a user interface,

[g] wherein: the user interface is configured to display indicia responsive to the measurements of the physiological parameter, and

[h] an orientation of the user interface is configurable responsive to a user input;

[i] a wall that surrounds at least the at least four detectors, wherein the wall operably connects to the substrate and the cover;

[j] a storage device configured to at least temporarily store at least the measurements of the physiological parameter; and

[k] a strap configured to position the physiological measurement device on the user.

Ex. 1001, 44:63–45:29 (bracketed lettering [pre]–[k] added).

E. Applied References

Petitioner relies upon the following references:

Sherman et al., U.S. Patent No. 4,941,236, filed July 6, 1989, issued July 17, 1990 (Ex. 1013, "Sherman");

Ali et al., U.S. Patent No. 6,584,336 B1, filed March 1, 2000, issued June 24, 2003 (Ex. 1019, "Ali");

Rantala et al., U.S. Patent No. 6,912,413 B2, filed September 12, 2003, issued June 28, 2005 (Ex. 1022, "Rantala");

Ohsaki et al., U.S. Patent Application Publication No. 2001/0056243 A1, filed May 11, 2001, published December 27, 2001 (Ex. 1009, "Ohsaki");

Aizawa, U.S. Patent Application Publication No. 2002/0188210 A1, filed May 23, 2002, published December 12, 2002 (Ex. 1006, "Aizawa"); and

Goldsmith et al., U.S. Patent Application Publication No. 2007/0093786 A1, filed July 31, 2006, published April 26, 2007 (Ex. 1011, "Goldsmith").

Pet. 10.

Petitioner also submits, *inter alia*, a Declaration of Dr. Thomas W. Kenny, Ph.D. (Ex. 1003) and a Second Declaration of Dr. Kenny (Ex. 1050). Patent Owner submits, *inter alia*, the Declaration of Dr. Vijay K. Madisetti (Ex. 2004). The parties also provide deposition testimony from Dr. Kenny and Dr. Madisetti, including from this proceeding and others. Exs. 1053–1056, 2006–2009, 2027.

F. Asserted Grounds of Unpatentability

We instituted an *inter partes* review based on the following grounds. Inst. Dec. 10–11, 42.

Claim(s) Challenged	35 U.S.C. §	References/Basis
1–10, 13–30	103	Aizawa, Ohsaki, Goldsmith
11	103	Aizawa, Ohsaki, Goldsmith, Sherman

Claim(s) Challenged	35 U.S.C. §	References/Basis
12	103	Aizawa, Ohsaki, Goldsmith, Rantala
1–10, 13–30	103	Aizawa, Ohsaki, Goldsmith, Ali
11	103	Aizawa, Ohsaki, Goldsmith, Ali, Sherman
12	103	Aizawa, Ohsaki, Goldsmith, Ali, Rantala

II. DISCUSSION

A. Claim Construction

For petitions filed on or after November 13, 2018, a claim "shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b)." 37 C.F.R. § 42.100(b) (2020). Accordingly, we construe the claims according to the standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005). Based on our analysis of Petitioner's challenges presented, we find that one claim term requires express construction.

Petitioner raises the issue of the proper scope of the claim term "processor" from claim 1 to a person of ordinary skill in the art. Pet. 51. Petitioner submits "[t]he '564 patent does not define 'processor,'" but argues that a person of ordinary skill in the art would understand the term to mean "part of a computer system that operates on data," consistent with the definition provided in Merriam-Webster's Collegiate Dictionary.[1] *Id.*; Ex. 1012, 5.

[1] Petitioner adds page numbers 1–6 to Exhibit 1012. We refer to the added page numbers when citing to Exhibit 1012 in this Decision.

In our Institution Decision, we observed that the claim language provides an understanding of the functions of the claimed one or more processers, which are "configured to:" "receive one or more signals" and "process the one or more signals to determine measurements of the physiological parameter." Inst. Dec. 11–12 (quoting Ex. 1001, 45:6–12). We noted that "[t]he Specification describes several distinct processors, but it also describes a 'signal processor' as the device used for processing signals." *Id.* at 12; *see, e.g.*, Ex. 1001, 9:50–55, 14:36–42, 15:27–56, 33:36–47.

Patent Owner does not object to our initial claim construction, and submits that claim terms should be given their ordinary and customary meaning, consistent with the Specification. PO Resp. 7.

Based on the final record, we maintain our initial interpretation of the term "processor" as meaning "part of a computer system that operates on data." *See* Ex. 1012, 5. This definition is consistent with the general operation of the signal processor in the '564 patent, where the signal processor is described to include "processing logic that determines measurements . . . based on the signals received from the detectors." Ex. 1001, 15:31–35; 15:35–39 ("signal processor 110 can be implemented using one or more microprocessors or subprocessors . . . digital signal processors, application specific integrated circuits (ASICs), field programmable gate arrays (FPGAs), combinations of the same").

Based on our analysis of the issues in dispute, we conclude that no further claim terms require express construction. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Matal*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

B. Principles of Law

A claim is unpatentable under 35 U.S.C. § 103(a) if "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) objective evidence of nonobviousness.[2] *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). When evaluating a combination of teachings, we must also "determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Whether a combination of elements would have produced a predictable result weighs in the ultimate determination of obviousness. *Id.* at 416–417.

In an *inter partes* review, the petitioner must show with particularity why each challenged claim is unpatentable. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016); 37 C.F.R. § 42.104(b). The burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To prevail, Petitioner must support its challenge by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d).

[2] The parties have not presented objective evidence of non-obviousness.

We analyze the challenges presented in the Petition in accordance with the above-stated principles.

C. Level of Ordinary Skill in the Art

Petitioner identifies the appropriate level of skill in the art as that possessed by a person having "a Bachelor of Science degree in an academic discipline emphasizing the design of electrical, computer, or software technologies, in combination with training or at least one to two years of related work experience with capture and processing of data or information." Pet. 8 (citing Ex. 1003 ¶¶ 21–22). "Additional education in a relevant field or industry experience may compensate for one of the other aspects of the . . . characteristics stated above." *Id.*

Patent Owner makes several observations regarding Petitioner's identified level of skill in the art but, "[f]or this proceeding, [Patent Owner] nonetheless applies Petitioner's asserted level of skill." PO Resp. 7–8.

We adopt Petitioner's assessment as set forth above, which appears consistent with the level of skill reflected in the Specification and prior art.

D. Obviousness over the Combined Teachings of Aizawa, Ohsaki, and Goldsmith

Petitioner contends that claims 1–10 and 13–30 of the '564 patent would have been obvious over the combined teachings of Aizawa, Ohsaki, and Goldsmith. Pet. 10–91; *see also* Pet. Reply 7–37. Patent Owner disagrees. PO Resp. 9–51; *see also* Sur-reply 1–27.

Based on our review of the parties' arguments and the cited evidence of record, we determine that Petitioner has met its burden of showing by a preponderance of the evidence that claims 1–10 and 13–30 are unpatentable.

1. Overview of Aizawa (Ex. 1006)

Aizawa is a U.S. patent application publication titled "Pulse Wave Sensor and Pulse Rate Detector," and discloses a pulse wave sensor that detects light output from a light emitting diode and reflected from a patient's artery. Ex. 1006, codes (54), (57).

Figure 1(a) of Aizawa is reproduced below.

FIG. 1 (a)

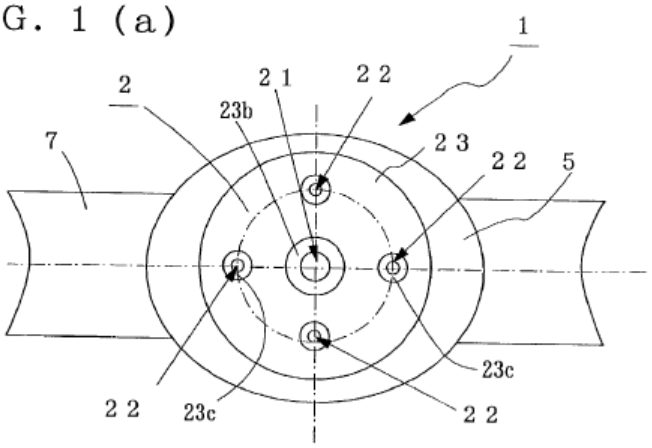


Figure 1(a) is a plan view of a pulse wave sensor. *Id.* ¶ 23. As shown in Figure 1(a), pulse wave sensor 2 includes light emitting diode ("LED") 21, four photodetectors 22 symmetrically disposed around LED 21, and holder 23 for storing LED 21 and photodetectors 22. *Id.* Aizawa discloses that, "to further improve detection efficiency, . . . the number of the photodetectors 22 may be increased." *Id.* ¶ 32, Fig. 4(a). "The same effect can be obtained when the number of photodetectors 22 is 1 and a plurality of light emitting diodes 21 are disposed around the photodetector 22." *Id.* ¶ 33.

Figure 1(b) of Aizawa is reproduced below.

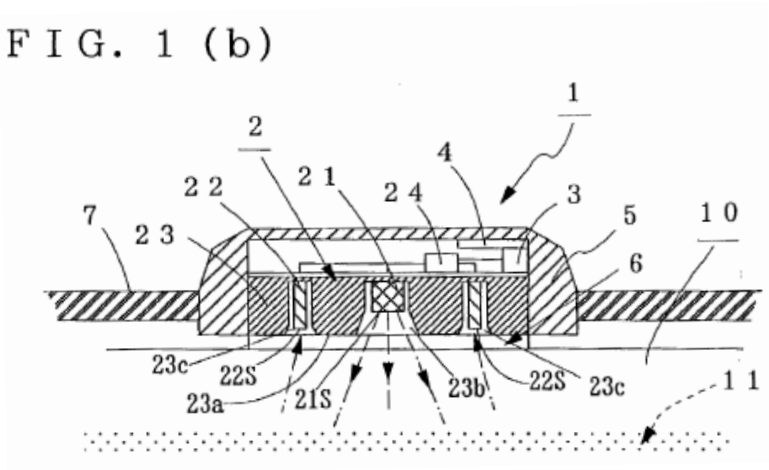


Figure 1(b) is a sectional view of the pulse wave sensor. *Id.* ¶ 23. As shown in Figure 1(b), pulse wave sensor 2 includes drive detection circuit 24 for detecting a pulse wave by amplifying the outputs of photodetectors 22. *Id.* Arithmetic circuit 3 computes a pulse rate from the detected pulse wave and transmitter 4 transmits the pulse rate data to an "unshown display." *Id.* The pulse rate detector further includes outer casing 5 for storing pulse wave sensor 2, acrylic transparent plate 6 mounted to detection face 23a of holder 23, and attachment belt 7. *Id.*

Aizawa discloses that LED 21 and photodetectors 22 "are stored in cavities 23b and 23c formed in the detection face 23a" of the pulse wave sensor. *Id.* ¶ 24. Detection face 23a "is a contact side between the holder 23 and a wrist 10, respectively, at positions where the light emitting face 21s of the light emitting diode 21 and the light receiving faces 22s of the photodetectors 22 are set back from the above detection face 23a." *Id.* Aizawa discloses that "a subject carries the above pulse rate detector 1 on the inner side of his/her wrist 10 . . . in such a manner that the light emitting face 21s of the light emitting diode 21 faces down (on the wrist 10 side)." *Id.* ¶ 26. Furthermore, "the above belt 7 is fastened such that the acrylic

transparent plate 6 becomes close to the artery 11 of the wrist 10. Thereby, adhesion between the wrist 10 and the pulse rate detector 1 is improved." *Id.* ¶¶ 26, 34.

2. Overview of Ohsaki (Ex. 1009)

Ohsaki is a U.S. patent application publication titled "Wristwatch-type Human Pulse Wave Sensor Attached on Back Side of User's Wrist," and discloses "an optical sensor for detecting [a] pulse wave of a human body." Ex. 1009, code (54), ¶ 3. Figure 1 of Ohsaki is reproduced below.

FIG. 1

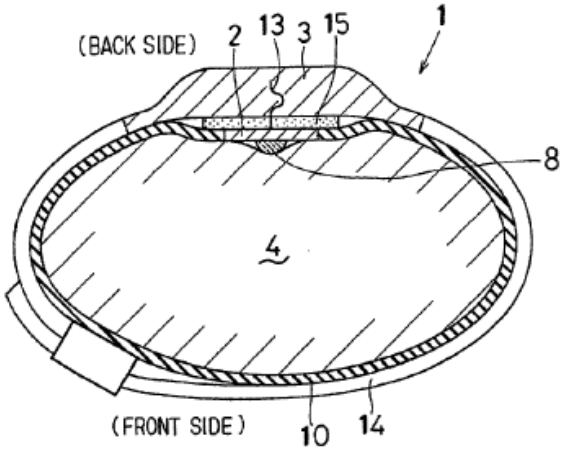


Figure 1 illustrates a cross-sectional view of pulse wave sensor 1 attached on the back side of user's wrist 4. *Id.* ¶¶ 12, 16. Pulse wave sensor 1 includes detecting element 2 and sensor body 3. *Id.* ¶ 16.

Figure 2 of Ohsaki, reproduced below, illustrates further detail of detecting element 2.

FIG. 2

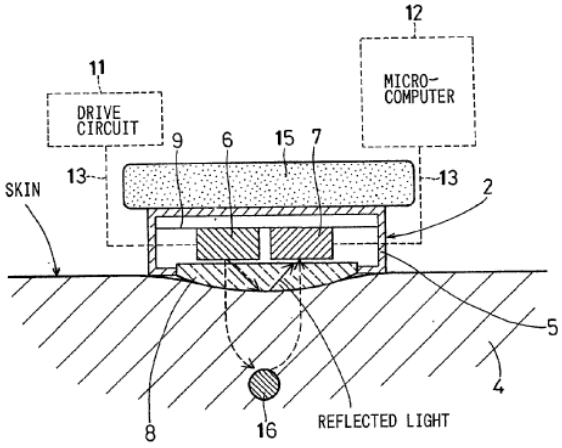


Figure 2 illustrates a mechanism for detecting a pulse wave. *Id.* ¶ 13. Detecting element 2 includes package 5, light emitting element 6, light receiving element 7, and translucent board 8. *Id.* ¶ 17. Light emitting element 6 and light receiving element 7 are arranged on circuit board 9 inside package 5. *Id.* ¶¶ 17, 19.

"[T]ranslucent board 8 is a glass board which is transparent to light, and attached to the opening of the package 5. A convex surface is formed on the top of the translucent board 8." *Id.* ¶ 17. "[T]he convex surface of the translucent board 8 is in intimate contact with the surface of the user's skin," preventing detecting element 2 from slipping off the detecting position of the user's wrist. *Id.* ¶ 25. By preventing the detecting element from moving, the convex surface suppresses "variation of the amount of the reflected light which is emitted from the light emitting element 6 and reaches the light receiving element 7 by being reflected by the surface of the user's skin." *Id.* Additionally, the convex surface prevents penetration by "noise such as disturbance light from the outside." *Id.*

Sensor body 3 is connected to detecting element 2 by signal line 13. *Id.* ¶ 20. Signal line 13 connects detecting element 2 to drive circuit 11, microcomputer 12, and a monitor display (not shown). *Id.* Drive circuit 11 drives light emitting element 6 to emit light toward wrist 4. *Id.* Detecting element 2 receives reflected light which is used by microcomputer 12 to calculate pulse rate. *Id.* "The monitor display shows the calculated pulse rate." *Id.*

3. Overview of Goldsmith (Ex. 1011)

Goldsmith is a U.S. patent application publication titled "Watch Controller for a Medical Device," and discloses a watch controller device that communicates with an infusion device to "provid[e] convenient monitoring and control of the infusion pump device." Ex. 1011, codes (54), (57).

Goldsmith's Figure 9A and 9B are reproduced below.

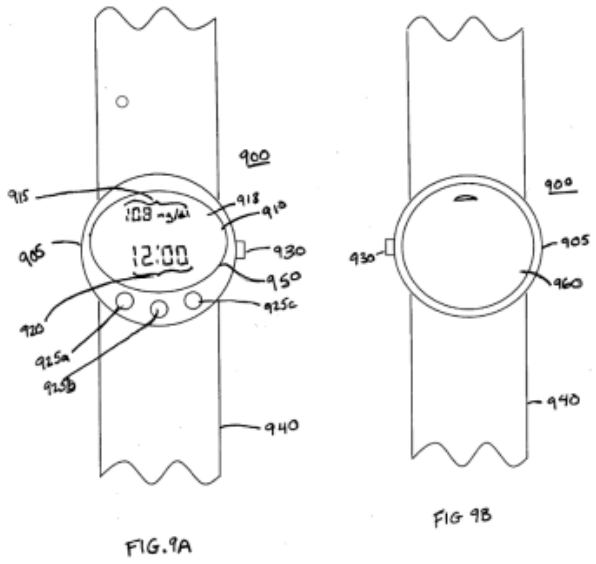


Figure 9A and Figure 9B are respective front and rear views of a combined watch and controller device. *Id.* ¶¶ 30–31. As shown in Figure 9A, watch

controller 900 includes housing 905, transparent member 950, display 910, input devices 925a–c, scroll wheel 930, and wrist band 940. *Id.* ¶¶ 85–86. Figure 9B shows rear-side cover 960, and a rear view of housing 905, scroll wheel 930, and wrist band 940. *Id*.

Goldsmith discloses the watch controller may interact with one or more devices, such as infusion pumps or analyte monitors. *Id.* ¶ 85; *see also id.* ¶ 88 ("The analyte sensing device 1060 may be adapted to receive data from a sensor, such as a transcutaneous sensor."). Display 910 "may display at least a portion of whatever information and/or graph is being displayed on the infusion device display or on the analyte monitor display," such as, e.g., levels of glucose. *Id*. ¶ 86. The display is customizable in a variety of configurations including user-customizable backgrounds, languages, sounds, font (including font size), and wall papers. *Id*. ¶¶ 102, 104. Additionally, the watch controller may communicate with a remote station, e.g., a computer, to allow data downloading. *Id*. ¶ 89 (including wireless). The remote station may also include a cellular telephone to be "used as a conduit for remote monitoring and programming." *Id.*

4. Independent Claim 1

Petitioner contends that claim 1 would have been obvious over the combined teachings of Aizawa, Ohsaki, and Goldsmith. Pet. 10–63. Below, we set forth how the combination of prior art references teaches or suggests the claim limitations that are not disputed by the parties. For those limitations and reasons for combining the references that are disputed, we examine each of the parties' contentions and then provide our analysis.

i. "[pre] A user-worn physiological measurement device comprising"

The cited evidence supports Petitioner's undisputed contention that Aizawa satisfies the subject matter of the preamble.[3] Pet. 41–42; *see, e.g.*, Ex. 1006 ¶ 26, code (57) ("a subject carries the above pulse rate detector 1 on the inner side of his/her wrist"), Fig. 2 (depicting a user wearing a pulse wave sensor on the inner side of his/her wrist); *see also* Ex. 1003 ¶ 98.[4]

ii. "[a] one or more emitters configured to emit light into tissue of a user"

The cited evidence supports Petitioner's undisputed contention that Aizawa discloses an emitter, LED 21, that emits light into a user's tissue. Pet. 42–43; *see, e.g.*, Ex. 1006 ¶ 23 ("LED 21 . . . for emitting light having a wavelength of a near infrared range"), ¶ 27 (explaining that light is emitted toward the wrist), Fig. 1(b) (depicting LED 21 facing user wrist 10), Fig. 2 (depicting a pulse wave sensor worn on a user's wrist).

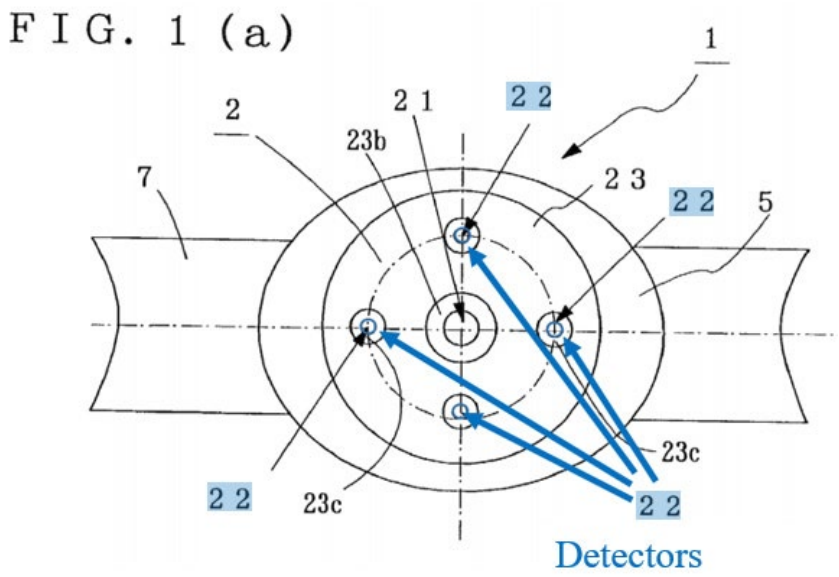
iii. "[b] at least four detectors arranged on a substrate;"

The cited evidence supports Petitioner's undisputed contention that Aizawa discloses at least four detectors. Pet. 23–25, 44–46; *see, e.g.*,

[3] Whether the preamble is limiting need not be resolved because Petitioner shows sufficiently that the preamble's subject matter is satisfied by the art.

[4] Petitioner further contends that the subject matter of the preamble is taught by the combination of Aizawa, Ohsaki, and Goldsmith. Pet. 41–42 (arguing that it would have been obvious to incorporate the pulse wave sensor of Aizawa (as modified by Ohsaki) into the wrist-worn watch controller device in Figures 9A and 9B of Goldsmith, to realize a user-worn physiological measurement device). Because Figure 2 of Aizawa teaches a user-worn physiological measurement device, further analysis of the combination of Aizawa, Ohsaki, and Goldsmith is not necessary for the preamble.

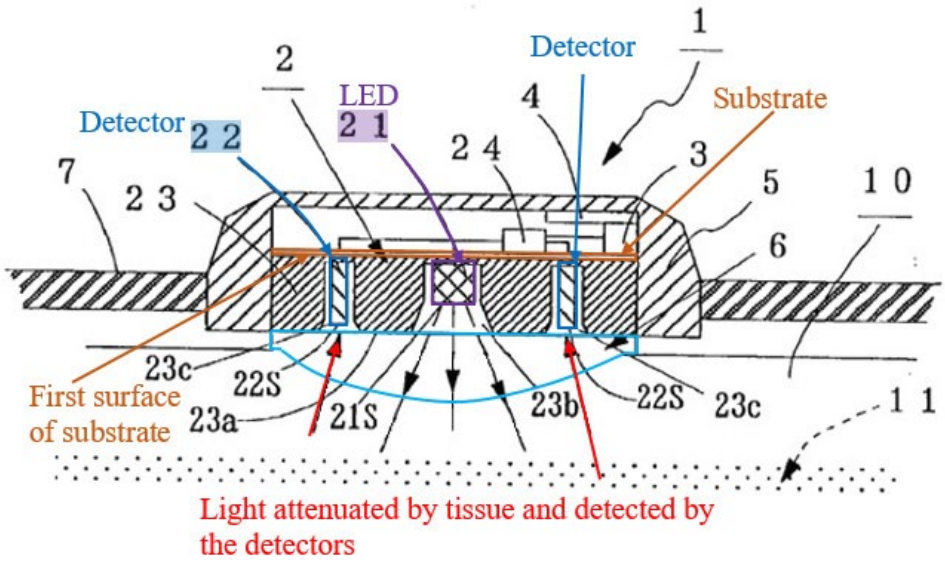
Ex. 1006 ¶¶ 9, 23 ("four phototransistors 22"), Figs. 1(a)–1(b); Ex. 1003 ¶¶ 43–45, 64–67. Petitioner contends that pulse wave sensor depicted in Figure 1(a) of Aizawa, reproduced below, discloses four photodetectors 22. Pet. 44; *see, e.g.*, Ex. 1006 ¶ 27 ("[F]our photodetectors 22 are disposed around the light emitting diode 21.").



Petitioner's Annotated Figure 1(a) of Aizawa depicts four photodetectors 22, identified by blue arrows and blue shading.

Relying on a cross-section view of Figure 1(b) of the pulse wave detector of Aizawa, Petitioner further contends photodetectors 22 are secured on a substrate illustrated in Petitioner's annotated Figure 1(b). Pet. 24, 45. Petitioner's annotated Figure 1(b) of Aizawa is reproduced below.

FIG. 1 (b)



Annotated Figure 1(b) depicts a structure, identified by Petitioner with brown highlight and the added label "Substrate," arranged in proximity to photodetectors 22. Pet. 45. Petitioner concedes that Aizawa "does not label or describe" a substrate, but contends a person of ordinary skill in the art ("POSITA") would have understood that "Aizawa's photodetectors are secured to the [physiological measure device] . . . through such a substrate" depicted in annotated Figure 1(b). Pet. 24. Dr. Thomas W. Kenny testifies that "[a] POSITA would have understood that the substrate provides physical support and electrical connectivity and is connected to the holder 23." Ex. 1003 ¶ 71; *see also* Pet. 24 (citing to testimony of Dr. Kenny). On the current record, Petitioner has sufficiently shown that the structure identified in annotated Figure 1(b) of Aizawa is a substrate, and that photodetectors 22 are arranged on the substrate.

Petitioner further contends that if Aizawa is found not to disclose a substrate, then Ohsaki teaches this feature. Pet. 25. Similar to the device of Aizawa, Ohsaki teaches a pulse wave sensor comprising a light emitting

element 6 (*e.g.*, a LED) and a light receiving element (*e.g.*, a photodetector). Ex. 1009 ¶ 17. "The light emitting element 6 and light receiving element 7 are . . . arranged on the circuit board 9." *Id.* Relying on the testimony of Dr. Kenny, Petitioner contends a POSITA would have modified the pulse wave sensor of Aizawa to include a substrate, such as circuit board 9 of Ohsaki, to secure the photodetectors of Aizawa and enable the detectors to send signals to other elements in the device. Pet. 25 (citing Ex. 1003 ¶¶ 72–73; Ex. 1006 ¶¶ 2–5, 8–16, 23, 27–29, 32–33, Figs. 1, 2, 3, 4(a); Ex. 1009 ¶ 17, Fig. 2).

The cited evidence, including the unrebutted testimony of Dr. Kenny, sufficiently supports Petitioner's stated reasoning.

iv. "[c] a cover comprising a protruding convex surface, wherein the protruding convex surface extends over all of the at least four detectors arranged on the substrate, wherein at least a portion of the protruding convex surface is rigid"

Petitioner's Undisputed Contentions

Petitioner contends that Aizawa discloses a cover, i.e., a "transparent plate positioned between the photodetectors and the wrist." Pet. 12 (citing Ex. 1006 ¶ 34). Patent Owner does not dispute this contention, and we agree with Petitioner. Aizawa discloses that "acrylic transparent plate 6 is provided on the detection face 23a of the holder 23 to improve adhesion to the wrist 10." Ex. 1006 ¶ 34, Fig. 1(b) (depicting transparent plate 6 between sensor 2 and wrist 10).

Petitioner also contends that Ohsaki teaches a wrist-worn sensor that includes a "translucent board" having a convex surface that contacts the user's skin. Pet. 15, 21. Patent Owner does not dispute this contention, and

we agree with Petitioner. Ohsaki discloses that sensor 1 includes detecting element 2 and sensor body 3, and is "worn on the back side of the user's wrist." Ex. 1009 ¶ 16. Ohsaki discloses that detecting element 2 includes package 5 and "translucent board 8[,which] is a glass board which is transparent to light, and [is] attached to the opening of the package 5. A convex surface is formed on the top of the translucent board 8." *Id.* ¶ 17. As seen in Ohsaki's Figure 2, translucent board 8 has a single protruding convex surface, which is placed between a user's tissue and a light receiving element (e.g., photodetector) 7 when the sensor is worn. *Id.* at Fig. 2. As also seen in Figure 2, the board 8 is operably connected to the walls of sensor package 5. *Id.* ¶ 17 ("The translucent board 8 is . . . attached to the opening of the package 5."), Fig. 2.

Claim 1 further requires that "at least a portion of the protruding convex surface is rigid." Petitioner contends that Ohsaki's Figure 2 depicts the user's tissue in intimate contact with the convex surface of the cover and the cover is sufficiently rigid to cause the skin to deform. Pet. 15, 48 (The "convex surface . . . causes the user's skin to deform . . . due to the rigidity of the convex surface."). Patent Owner does not dispute this contention, and we agree with Petitioner. Ohsaki's Figure 2 depicts the user's tissue 4 deforming and conforming to the shape of the protruding convex surface when the sensor is worn by the user. Ex. 1009 ¶ 17 ("The translucent board 8 is a glass board."), Fig. 2.

Petitioner's Disputed Contentions

Petitioner further contends that a person of ordinary skill in the art "would have found it obvious to modify Aizawa's sensor to include a cover having a protruding convex surface," so as to [1] improve adhesion between

the user's wrist and the sensor's surface, [2] improve detection efficiency, and [3] protect the elements within sensor housing. Pet. 20–23 (citing, e.g., Ex. 1003 ¶¶ 67–70; Ex. 1009 ¶ 25). Petitioner contends that Ohsaki's convex surface is in "intimate contact" with the user's skin, which prevents slippage of the sensor and increases signal strength because "variation of the amount of the reflected light . . . that reaches the light receiving element 7 is suppressed" and because "the pulse wave can be detected without being affected by the movement of the user's wrist 4," as compared to a sensor with a flat surface. *Id.* at 21–22 (citing, e.g., Ex. 1003 ¶ 68; quoting Ex. 1009 ¶¶ 15, 17, 25, Figs. 1, 2, 4A, 4B). Accordingly, Petitioner contends that a person of ordinary skill in the art would have modified Aizawa's sensor to include a cover with a protruding convex surface, as taught by Ohsaki, that is "between a surface of the sensor and the user's wrist." Pet. 20–22 (citing, e.g., Ex. 1003 ¶¶ 67–70).

Petitioner contends this modification would have been "nothing more than the use of a known technique to improve similar devices in the same way," i.e., "when Ohsaki's PMD is worn 'the convex surface of the translucent board . . . is in intimate contact with the . . . user's skin'; this contact prevents slippage, which increases the strength of the obtainable signals." Pet. 20–21 (citing Ex. 1003 ¶¶ 67–68).

To illustrate its proposed modification, Petitioner includes two annotated versions of Aizawa's Figure 1(b), both of which are reproduced below. Pet. 19–23 (citing Ex. 1003 ¶¶ 66–70).

FIG. 1 (b)

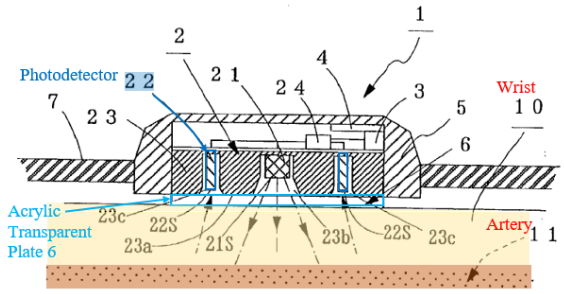
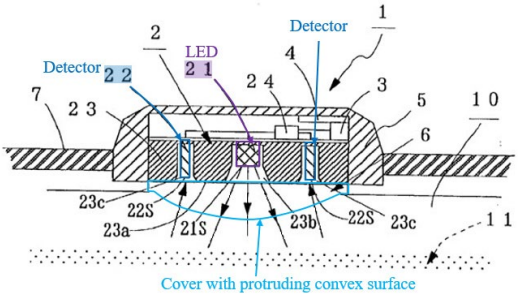


FIG. 1 (b)



Petitioner's annotated figure on the left depicts Aizawa's sensor, modified to include a flat "acrylic transparent plate" (illustrated with blue outline); Petitioner's annotated figure on the right depicts Aizawa's sensor, modified to include a "cover with protruding convex surface" (illustrated with blue outline).

Patent Owner's Arguments

Patent Owner argues that a person of ordinary skill in the art would not have been motivated to modify Aizawa's sensor to include Ohsaki's convex cover. PO Resp. 16–46;[5] Sur-reply 3–25.

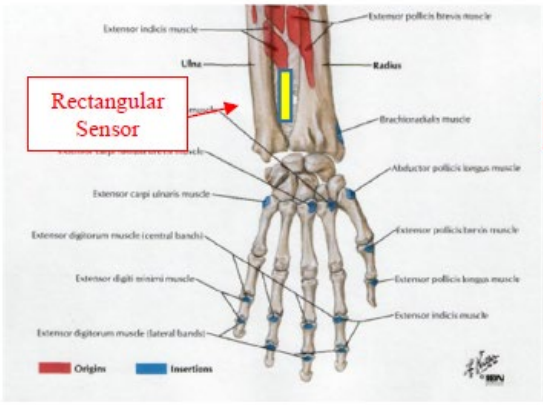
First, Patent Owner argues "Ohsaki's rectangular board would be incompatible with Aizawa's circular sensor arrangement" and that the proposed modification "eliminates the longitudinal shape that Ohsaki specifically identifies as important for the benefit of reducing slipping." PO Resp. 16–18 (emphases omitted). This argument is premised on Patent

[5] Patent Owner further argues, "[t]o the extent Petitioner contends a [person of ordinary skill in the art] would use Ohsaki's rectangular board on Aizawa's circular sensor . . . , that argument is unsupported and incorrect." PO Resp. 23 (emphasis omitted). We do not read the Petition as making such a contention. We understand Petitioner to propose, in essence, changing Aizawa's circular *flat* cover into a circular *convex* cover. *See, e.g.*, Pet. 22–23.

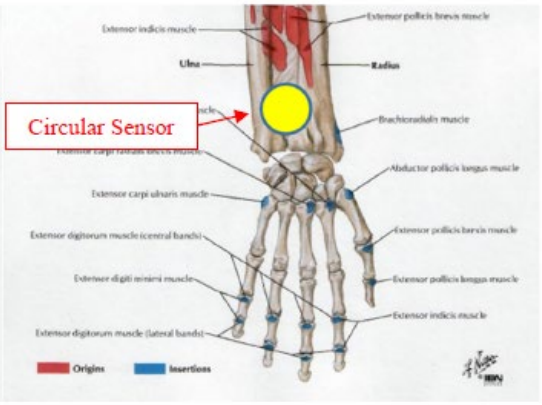
Owner's contention that Ohsaki's convex cover must be rectangular, with the cover's long direction aligned with the length of the user's forearm, to avoid interacting with bones in the wrist and forearm. *Id.* at 18–23 (citing, e.g., Ex. 2004 ¶¶ 48–55; Ex. 1009 ¶¶ 6, 19, 23–25); *see also* Sur-reply 3–11. According to Patent Owner, Ohsaki teaches that "aligning the sensor's longitudinal direction with the circumferential direction of the user's arm undesirably results in 'a tendency [for Ohsaki's sensor] to slip off.'" PO Resp. 19 (emphasis omitted) (alteration in original) (citing Ex. 1009 ¶ 19).

Thus, Patent Owner contends that Petitioner's proposed modification would "chang[e] Ohsaki's rectangular board into a circular shape," which "would eliminate the advantages discussed above" because it "cannot be placed in any longitudinal direction and thus [could not] coincide with the longitudinal direction of the user's wrist." *Id.* at 20–21 (emphases omitted) (citing Ex. 2004 ¶¶ 50–51). Patent Owner presents annotated Figures depicting what it contends is Ohsaki's disclosed sensor placement as compared to that of the proposed modification, reproduced below.

Ohsaki's Longitudinal Teachings



Petitioner's Proposed Combination



Patent Owner's annotated Figure on the left depicts a rectangular sensor placed between a user's radius and ulna, while Patent Owner's annotated

Figure on the right depicts a circular sensor placed across a user's radius and ulna. Based on these annotations, Patent Owner argues that the proposed "circular shape would press on the user's arm in all directions and thus [would not] avoid [the] undesirable interaction with the user's bone structure," such that a skilled artisan "would have understood that any such change would eliminate Ohsaki's benefit of preventing slipping." PO Resp. 21–23 (citing, e.g., Ex. 2004 ¶¶ 48–55).

Patent Owner additionally argues that "changing Aizawa's circular sensor to accommodate Ohsaki's longitudinal structure would result in less consistent measurements" and would "disrupt Aizawa's circular symmetry." *Id.* at 2. This argument is premised on Patent Owner's contention that Ohsaki's convex cover must be rectangular. *Id.* at 23 (citing Ex. 2004 ¶ 57). According to Patent Owner, "placing Ohsaki's rectangular board onto Aizawa's circular sensor would result in undesirable asymmetrical pressure and inconsistent contact at the peripheral edge where Aizawa's detectors are located," which would "create air gaps over some of Aizawa's peripherally arrayed detectors, but not others, which could result in degraded optical signals." *Id.* at 24–25 (emphasis omitted) (citing Ex. 2004 ¶¶ 58–59). Thus, Patent Owner argues that a person of ordinary skill in the art "would not have been motivated to use Ohsaki's rectangular board with Aizawa's circular sensor." *Id.* at 25 (citing Ex. 2004 ¶¶ 58–59).

Second, Patent Owner argues that Ohsaki requires its sensor be placed on the back of the user's wrist to achieve any benefits, but that such a location would have been unsuitable for Aizawa's sensor. PO Resp. 25–26. Specifically, Patent Owner argues that Aizawa's sensor must be worn on the palm side of the wrist, close to radial and ulnar arteries, which is the side

opposite from where Ohsaki's sensor is worn. *Id.* at 26–32 (citing, e.g., Ex. 1006 ¶¶ 2, 7, 9, 26, 27, 36; Ex. 2004 ¶¶ 60–67). According to Patent Owner, Ohsaki teaches that the sensor's convex surface has a tendency to slip when placed on the palm side of the wrist, i.e., in the location taught by Aizawa. *Id.* at 32–35 (citing, e.g., Ex. 1009 ¶¶ 19, 23–24; Ex. 2004 ¶¶ 68–80). Thus, Patent Owner argues that a person of ordinary skill in the art "would not have been motivated to use Ohsaki's longitudinal board—designed to be worn on the back side of a user's wrist—with Aizawa's palm-side sensor." *Id.* at 35 (emphases omitted). Similarly, Patent Owner argues that Aizawa teaches away from the proposed modification because Aizawa teaches that its flat acrylic plate improves adhesion on the palm side of the wrist, while Ohsaki teaches that its convex board "has a tendency to slip" on the palm side of the wrist. *Id.* at 35–38 (citing, e.g., Ex. 2004 ¶¶ 75–78).

Third, Patent Owner argues that a person of ordinary skill in the art would not have placed Ohsaki's convex cover over Aizawa's peripheral detectors because the convex cover would condense light toward the center and away from Aizawa's detectors, which would decrease optical signal strength. PO Resp. 38–44 (citing, e.g., Ex. 2004 ¶¶ 79–88). Patent Owner also contends that Petitioner and Dr. Kenny admitted as much in a related proceeding. *Id.* at 39–40 (citing, e.g., Ex. 2019, 45; Ex. 2020, 69–70). Patent Owner also relies on Figure 14B of the '564 patent to support its position. *Id.* at 40 (citing Ex. 1001, 36:12–15, 36:23–25). In light of the foregoing, Patent Owner argues that a person of ordinary skill in the art would have understood that the proposed modification would have decreased signal strength by directing light away from Aizawa's peripheral detectors. *Id.* at 43.

Fourth and finally, Patent Owner argues that a person of ordinary skill in the art "would have understood that Aizawa's flat plate would provide better protection than a convex surface" because it "would be less prone to scratches." *Id.* at 44–46 (citing Ex. 1008 ¶ 106; Ex. 2004 ¶ 90) (emphasis omitted).

Petitioner's Reply

Concerning Patent Owner's first and second arguments, Petitioner responds that Ohsaki does not disclose the shape of its protrusion, other than its convexity as shown in Figures 1 and 2, nor does Ohsaki require a rectangular shape or placement on the back of the wrist in order to achieve the disclosed benefits. Pet. Reply 7–20 (citing, e.g., Ex. 1050 ¶¶ 7–30). Moreover, Petitioner asserts that "even if Ohsaki's translucent board 8 were [somehow] understood to be rectangular, obviousness does not require 'bodily incorporation' of features from one reference into another"; rather, a person of ordinary skill in the art "would have been fully capable of modifying Aizawa to feature a light permeable protruding convex cover to obtain the benefits" taught by Ohsaki. *Id.* at 15–16 (citing, e.g., Ex. 1050 ¶ 23). Similarly, regarding the location of the sensor, Petitioner asserts,

> [E]ven assuming for the sake of argument that a [person of ordinary skill in the art] would have understood Aizawa's sensor as being limited to placement on the backside of the wrist, and would have understood Ohsaki's sensor's "tendency to slip" when arranged on the front side as informing consideration of Ohsaki's teachings with respect to Aizawa, that would have further motivated the [person of ordinary skill in the art] to implement a light permeable convex cover in Aizawa's sensor, to improve detection efficiency of that sensor when placed on the palm side.

Id. at 18 (citing, e.g., Ex. 1050 ¶ 25) (emphasis omitted). In other words, Ohsaki's disclosure that a convex surface suppresses variation in reflected light would have motivated an artisan to add such a surface to Aizawa to improve detection efficiency of that sensor when placed on the palm side. *Id.* at 18.

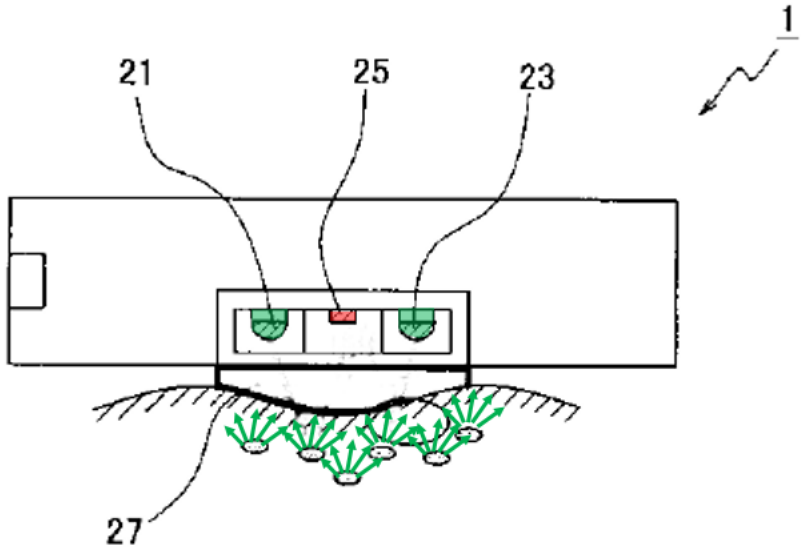
Concerning Patent Owner's third argument, Petitioner responds that adding a convex cover to Aizawa's sensor would not decrease signal strength but, instead, "would improve Aizawa's signal-to-noise ratio by causing more light backscattered from tissue to strike Aizawa's photodetectors than would have with a flat cover" because such a cover improves light concentration across the entire lens and does not direct it only towards the center. *Id.* at 20–21 (citing, e.g., Ex. 1050 ¶¶ 31–34).

Petitioner asserts that Patent Owner and Dr. Madisetti "ignore[] the well-known principle of reversibility," by which "a ray going from P to S will trace the same route as one from S to P." Pet. Reply 22 (quoting Ex. 1051, 84, 92; Ex. 1052, 101, 110; Ex. 1053, 80:20–82:20). When applied to Aizawa's sensor, Petitioner contends that any condensing benefit achieved by a convex cover would thus direct emitted light toward Aizawa's peripheral detectors. *Id.* at 22–24 (citing, e.g., Ex. 1050 ¶¶ 35–43). Although Dr. Madisetti refused to acknowledge "this basic principle of reversibility during deposition," Petitioner contends this core concept of reversibility is applied in Aizawa. *Id.* at 24–25 (citing, e.g., Ex. 1006 ¶ 33; Ex. 1050 ¶ 44; Ex. 1055, 209:19–21).

Petitioner also asserts that Patent Owner and Dr. Madisetti overlook the fact that light rays reflected by body tissue will be scattered and diffuse and will approach the detectors "from various random directions and

angles." Pet. Reply 25–29 (citing, e.g., Ex. 1021, 52, 86, 90; Ex. 1050 ¶¶ 42–47; Ex. 1051, 841; Ex. 1052, 101; Ex. 1053, 80:20–82:20). This scattered and diffuse light, according to Petitioner, means that Ohsaki's convex cover cannot "focus all light at the center of the sensor device," as Patent Owner argues. *Id.* at 26. Instead, due to the random nature of this scattered light, Petitioner asserts that a person of ordinary skill in the art would have understood that "Ohsaki's convex cover provides a slight refracting effect, such that light rays that may have missed the detection area are instead directed toward that area as they pass through the interface provided by the cover." *Id.* at 27 (citing, e.g., Ex. 1050 ¶ 50). Petitioner applies this understanding to Aizawa, and asserts that using a cover with a convex protrusion in Aizawa would "enable backscattered light to be detected within a circular active detection area." *Id.* (citing, e.g., Ex. 1021, 86, 90; Ex. 1050 ¶ 49).

Petitioner relies upon the following illustration of this alleged effect. Pet. Reply 30 (citing Ex. 1050 ¶ 54).



The above illustration depicts backscattered light with Aizawa's sensor reflecting off user tissue in various directions, such that it impinges upon the peripheral detectors from various random angles and directions. *Id.* According to Petitioner, this allows the detector to capture "light rays that otherwise would have missed the active detection area are instead directed toward that area." *Id.* at 31 (citing Ex. 1050 ¶ 55).

Petitioner also dismisses Patent Owner's reliance on Figure 14B of the '564 patent because it "is not an accurate representation of light that has been reflected from a tissue measurement site." Pet. Reply 28 (citing, e.g., Ex. 1050 ¶¶ 51–52). According to Petitioner, for example, "[t]he light rays (1420) shown in FIG. 14B are collimated (i.e., travelling paths parallel to one another), and each light ray's path is perpendicular to the detecting surface." *Id.* at 28–29.

Concerning Patent Owner's fourth argument, Petitioner responds that even if a flat surface might be less prone to scratching, that possible disadvantage would have been weighed against the "known advantages of applying Ohsaki's teachings," and would not negate a motivation to combine. *Id.* at 33 (citing, e.g., Ex. 1050 ¶ 60).

Patent Owner's Sur-reply

Concerning Patent Owner's first and second arguments, Patent Owner reiterates its position that Ohsaki's purported benefits attach only to a sensor with a rectangular convex surface that is located on the back of the wrist, and that "even small changes in sensor orientation or measurement location result in slippage." Sur-reply 1, 3–15, 8.

Concerning Patent Owner's third argument (that the convex cover would condense light toward the center and away from Aizawa's detectors),

Patent Owner argues that Dr. Kenny and Petitioner have not overcome their admissions that a convex lens directs light toward the center. *Id.* at 15–16, 19–21. Patent Owner asserts that Petitioner's Reply improperly presents several new arguments, relying on new evidence, as compared with the Petition. *Id.* at 16–19 (regarding reversibility). Moreover, Patent Owner argues that Petitioner's discussion of the principle of reversibility is "irrelevant" because it "assumes conditions that are not present when tissue scatters and absorbs light." *Id.* at 16–17. The random nature of backscattered light, in Patent Owner's view, "hardly supports Petitioner's argument that light will necessarily travel the same paths regardless of whether the LEDs and detectors are reversed," and is irrelevant to the central issue presented here of "whether changing Aizawa's flat surface to a convex surface results in more light on Aizawa's peripherally located detectors." *Id.* at 18.

Patent Owner also asserts that Petitioner mischaracterizes Patent Owner's position, which is not that Ohsaki's cover with a convex protrusion "focuses ***all*** light to a single point" at the center of the sensor as Petitioner characterizes it. Sur-reply 20. Patent Owner's position, rather, is that Petitioner has not shown that a person of ordinary skill in the art "would have been motivated to change Aizawa's flat surface to a convex surface to improve signal strength." *Id.* In Patent Owner's view, by arguing that the convex cover provides only a "slight refracting effect," Petitioner undermines its contention that providing such a cover would have improved detection efficiency. *Id.* at 20–21 (emphasis omitted).

Patent Owner also argues that Petitioner's contention that a convex cover allows more light collection generally is a new theory not supported

by Dr. Kenny's original declaration. *Id.* at 20. Moreover, Patent Owner argues that Petitioner's theory is "unavailing because it fails to consider the greater decrease in light at the detectors due to light redirection to a more central location." *Id.* at 21 (emphasis omitted). According to Patent Owner, any light redirected from the sensor's edge could not make up for the loss of signal strength from light redirected away from the detectors and toward the center. *Id.*

Concerning Patent Owner's fourth argument, Patent Owner argues that Petitioner does not dispute Patent Owner's position that a flat cover would be less prone to scratches and offers "***no*** plausible advantages for its asserted combination." *Id.* at 24. Moreover, Patent Owner argues that the risk of scratches undermines Petitioner's argument of adding a convex cover to protect the elements within the sensor housing. *Id.* at 25.

Analysis

As noted above, Petitioner provides three rationales to support its contention that a person of ordinary skill in the art would have provided "a light permeable cover with a protruding convex surface," such as that taught by Ohsaki, to Aizawa's sensor: (1) to improve adhesion between the sensor and the user's tissue; (2) to improve detection efficiency; and (3) to protect the elements within the sensor housing. Pet. 20–23 (citing, e.g., Ex. 1003 ¶¶ 67–70; Ex. 1009 ¶ 25). As further examined below, we determine all three rationales are supported by the evidence, and further that any single rationale standing alone would have been sufficient to establish a basis for the person of ordinary skill in the art to combine the references as proposed.

Rationales 1 and 2

The evidence of record persuades us that adding a convex cover, such as that taught by Ohsaki, would have improved adhesion between the sensor and the user's skin, which would have increased the signal strength of the sensor. Ohsaki teaches as much:

> [T]he convex surface of the translucent board 8 is in intimate contact with the surface of the user's skin. Thereby *it is prevented that the detecting element 2 slips off* the detecting position of the user's wrist 4. If the translucent board 8 has a flat surface, the detected pulse wave is adversely affected by the movement of the user's wrist 4 as shown in Fig. 4B. However, in the case that the translucent board 8 has a convex surface like the present embodiment, the *variation of the amount of the reflected light which is emitted from the light emitting element 6 and reaches the light receiving element 7 by being reflected by the surface of the user's skin is suppressed*. *It is also prevented that noise such as disturbance light from the outside penetrates the translucent board 8*. Therefore the pulse wave can be detected without being affected by the movement of the user's wrist 4 as shown in FIG. 4A.

Ex. 1009 ¶ 25 (emphasis added); *see also id.* ¶ 27 ("detecting element 2 is stably fixed").

We credit Dr. Kenny's testimony that a person of ordinary skill in the art would have been motivated by such teachings to apply a cover with a convex surface to Aizawa to improve that similar device in the same way and to yield predictable results, i.e., to resist movement of the sensor on the user's wrist and to suppress variation. *See, e.g.*, Ex. 1003 ¶¶ 68 ("[T]his contact between the convex surface and the user's skin prevents slippage, which increases the strength of the signals obtainable by Ohsaki's [sensor]."), 70, 103 (One of ordinary skill would have understood that this "would have been used to realize improved adhesion between the user's

wrist and the sensor's surface, improve detection efficiency."). We find persuasive Dr. Kenny's explanation that the person of ordinary skill in the art "would have understood that a protruding convex cover would reduce the adverse effects of user movement on signals obtainable by photodetectors which are positioned to detect light reflected from user tissue." Ex. 1050 ¶ 13.

Indeed, Ohsaki expressly compares the performance of a wrist-worn pulse wave sensor depending on whether translucent board 8 is convex or flat, and concludes the convex surface results in improved performance over the flat surface, especially when the user is moving. Ex. 1009, Figs. 4A–4B, ¶¶ 15, 25 (stating that with "a flat surface, the detected pulse wave is adversely affected by the movement of the user's wrist 4," and with "a convex surface like the present embodiment, the variation of the amount of the reflected light" collected by the sensor "is suppressed"). Ohsaki also states that, with a convex surface, "[i]t is also prevented that noise such as disturbance light from the outside penetrates the translucent board 8." *Id.* ¶ 25.

We also credit Dr. Kenny's testimony that the proposed modification would have been within the skill level of an ordinary artisan. For example, Dr. Kenny testifies that one of ordinary skill in the art would have combined the teachings of Aizawa and Ohsaki as "[d]oing so would have amounted to nothing more than the use of a known technique to improve similar devices in the same way and combining prior art elements according to known methods to yield predictable results." Ex. 1003 ¶ 67. In particular, one of ordinary skill in the art would have recognized that by incorporating Ohsaki's convex surface, "'the convex surface of the translucent board . . . is

in intimate contact with the surface of the user's skin'; this contact between the convex surface and the user's skin prevents slippage, which increases the strength of the signals obtainable by Ohsaki's [sensor]." *Id.* ¶ 68 (citing Ex. 1009 ¶¶ 15, 17, 25, Figs. 1, 2, 4A, 4B).

In light of Ohsaki's express disclosure of the benefits of a convex cover, we credit Dr. Kenny's testimony that a person of ordinary skill in the art would have been motivated to modify Aizawa as proposed, and would have had a reasonable expectation of success in doing so.

We next address Patent Owner's first through third arguments, each of which implicates Petitioner's first and second asserted rationales of improved adhesion and detection efficiency.

Patent Owner's first argument is premised on the notion that Ohsaki's benefits only can be realized with a rectangular convex surface, because such a shape is required to avoid interacting with bones on the back of the user's forearm. PO Resp. 8–25. We disagree. Ohsaki does not disclose the shape of its convex cover, much less require it be rectangular. In fact, Ohsaki is silent as to the shape of the convex surface. Ohsaki discloses that sensor 1 includes detecting element 2, which includes package 5 within which the sensor components are located. Ex. 1009 ¶ 17. Ohsaki's convex surface is located on board 8, which is "attached to the opening of the package 5." *Id.* Ohsaki provides no further discussion regarding the shape of board 8 or its convex protrusion.

We disagree with Patent Owner's suggestion that the shape of the convex surface can be inferred to be rectangular from Ohsaki's Figures 1 and 2. PO Resp. 10–11. Ohsaki does not indicate that these figures are drawn to scale, or reflect precise dimensions or shapes of the convex

surface. *See, e.g.*, Ex. 1009 ¶ 13 ("schematic diagram"); *see also* Pet. Reply 12–15; *Hockerson-Halberstadt, Inc. v. Avia Group Int'l*, 222 F.3d 951, 956 (Fed. Cir. 2000) ("[I]t is well established that patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue.").

To be clear, Ohsaki describes the shape of *detecting element 2* as rectangular: "[T]he length of the detecting element 2 from the right side to the left side in FIG. 2 is longer than the length from the upper side to the lower side." Ex. 1009 ¶ 19. Ohsaki also describes that detecting element 2 is aligned longitudinally with the user's forearm: "[I]t is desirable that the detecting element 2 is arranged so that its longitudinal direction agrees with the longitudinal direction of the user's arm," to avoid slipping off. *Id.*; *see also id.* ¶ 9 ("The light emitting element and the light receiving element are arranged in the longitudinal direction of the user's arm.").

In light of this disclosed rectangular shape of detecting element 2, it is certainly possible that Ohsaki's convex surface may be similarly shaped. But, it may not be. Contrary to Patent Owner's argument, Ohsaki neither describes nor requires detecting element 2 to have the same shape as the convex surface of board 8. *Accord* Pet. Reply. 12–13 (noting also that Ohsaki's board 8 "is not coextensive with the entire tissue-facing side of detecting element 2"). We have considered the testimony of both Dr. Kenny and Dr. Madisetti on this point. Ex. 1050 ¶¶ 8, 11–12, 18–23; Ex. 2004 ¶¶ 35–39 (relying on Ohsaki's Figures 1–2 to support his opinion that the convex surface is rectangular). Dr. Madisetti's reliance on the dimensions of Ohsaki's figures is unpersuasive. *Hockerson-Halberstadt*, 222 F.3d at 956.

We credit Dr. Kenny's testimony that Ohsaki does not describe its convex surface as rectangular, because this testimony is most consistent with Ohsaki's disclosure.

Further, Patent Owner suggests that the convex surface *must be* rectangular, in order to avoid interacting with bones in the user's forearm. PO Resp. 18–23; Sur-reply 10 ("[A] POSITA would have understood Ohsaki's convex board must also have a longitudinal shape oriented up-and-down the watch-side of the user's wrist/forearm.") (emphasis omitted). Although Ohsaki recognizes that interaction with these bones can cause problems, *see* Ex. 1009 ¶¶ 6, 19, we do not agree that the *only way* to avoid these bones is by aligning a rectangular cover with the longitudinal direction of the user's forearm. For example, in the annotated Figures provided by Patent Owner, *see* PO Resp. 21, we discern that the circular sensor that purports to depict the proposed modification would *also* avoid the bones in the forearm if it were slightly smaller. Patent Owner provides no persuasive explanation to justify the dimensions it provides in this annotated figure, or to demonstrate that such a large sensor would have been required. Indeed, we discern that it would have been within the level of skill of an ordinary artisan to appropriately size a modified sensor to avoid these well-known anatomical obstacles. "A person of ordinary skill is also a person of ordinary creativity, not an automaton." *KSR*, 550 U.S. at 421. After all, an artisan must be presumed to know something about the art apart from what the references disclose. *See In re Jacoby*, 309 F.2d 513, 516 (CCPA 1962).

Finally, we do not agree with Patent Owner's position that Ohsaki's advantages apply only to rectangular convex surfaces. As discussed, Patent Owner has not shown that Ohsaki's convex surface is rectangular at all.

Moreover, even if Ohsaki's convex surface is rectangular, when discussing the benefits associated with a convex cover, Ohsaki does not limit those benefits to a cover of any particular shape. Instead, Ohsaki explains that "detecting element 2 is arranged on the user's wrist 4 so that the convex surface of the translucent board 8 is in intimate contact with the surface of the user's skin. Thereby it is prevented that the detecting element 2 slips off the detecting position of the user's wrist 4." Ex. 1009 ¶ 25; Ex. 1050 ¶ 18. Thus, we agree with Petitioner that Ohsaki's teaching of a convex surface would have motivated a person of ordinary skill in the art to add such a surface to Aizawa's circular-shaped sensor, to improve adhesion as taught by Ohsaki. *See, e.g.*, Pet. 20–23. Nothing in Ohsaki's disclosure limits such a benefit to a specific shape of the convex surface. Ex. 1050 ¶¶ 10–11, 14–23.

Moreover, Ohsaki contrasts the ability to properly receive reflected light with a convex surface as compared to a flat surface and notes that,

> in the case that the translucent board 8 has a convex surface . . . the variation of the amount of the reflected light which is emitted from the light emitting element 6 and reaches the light receiving element 7 by being reflected by the surface of the user's skin is suppressed. It is also prevented that noise such as disturbance light from the outside penetrates the translucent board 8. Therefore the pulse wave can be detected without being affected by the movement of the user's wrist 4 as shown in FIG. 4A.

Ex. 1009 ¶ 25; Ex. 1050 ¶¶ 12–13. Again, we agree with Petitioner that Ohsaki's teaching of a convex surface would have motivated a person of ordinary skill in the art to add such a surface to Aizawa's sensor, to improve signal strength, as taught by Ohsaki. *See, e.g.*, Pet. 21–23. Again, nothing

in Ohsaki's disclosure limits such a benefit to the shape of the convex surface. Ex. 1050 ¶¶ 10–11, 14–23.

Accordingly, we do not agree that Ohsaki's disclosed advantages attach only to a rectangular convex surface, or would have been inapplicable to the proposed combination of Aizawa and Ohsaki.

We have also considered Patent Owner's arguments that Petitioner's proposed modification would disrupt Aizawa's "circular symmetry." *See* PO Resp. 23–25. We do not agree. Rather we agree with Petitioner that the proposed modification is not a bodily incorporation. That is, Petitioner does not propose a bodily incorporation of Ohsaki's rectangular board into Aizawa's circular cover. Pet. Reply 15–16. Petitioner proposes modifying Aizawa only to include a cover with a convex surface. Pet. 20. We agree with Petitioner that a person of ordinary skill in the art, "is also a person of ordinary creativity, not an automaton," and is capable of modifying Aizawa to, *inter alia*, minimize any gap when including a cover with a convex surface. Indeed, a purpose of Petitioner's proposed modification is to increase signal strength. *See, e.g.*, Pet. 21–23. We discern that it would have been within the capability of an ordinarily skilled artisan to eliminate any gap that would have decreased signal strength or quality. Ex. 1050 ¶ 29.

We have considered Patent Owner's second argument, that Ohsaki's benefits are realized only when the sensor and convex surface are placed on the back of the user's wrist, which is the opposite side of the wrist taught by Aizawa. PO Resp. 25–38. We do not agree. As an initial matter, Petitioner does not propose bodily incorporating the references; Petitioner simply proposes adding a convex cover to Aizawa's sensor, without discussing where Aizawa's sensor is used. *See, e.g.*, Pet. 20. In other words,

Petitioner's proposed modification does not dictate any particular placement, whether on the palm side or back side of the wrist.

To be sure, Ohsaki's Figures 3A–3B compare the performance of detecting element 2, including its translucent board 8 having a convex protrusion, and show better performance when the element is attached to the back side of the wrist versus the front side of the wrist, when the user is in motion. *See* Ex. 1009 ¶¶ 23–24, Figs. 3A–3B. However, we do not agree that these figures support Dr. Madisetti's conclusion that "Ohsaki indicates a convex surface only prevents slipping on the back (i.e., watch) side of the wrist in a specific orientation, but tends to slip when used in different locations or orientations" such as the palm side of the wrist—particularly in comparison to a flat surface such as Aizawa's. Ex. 2004 ¶¶ 60, 73. Instead, Ohsaki acknowledges that, even when the detecting element is located "on the front [palm] side of the user's wrist 4, *the pulse wave can be detected well* if the user is at rest." Ex. 1009 ¶ 23 (emphasis added). Thus, Ohsaki discloses that, in at least some circumstances, a convex surface located on the front of the user's wrist achieves benefits. *Id.* Notably, Ohsaki's claims are not limited to detection during movement or exercise.

We credit, instead, Dr. Kenny's testimony that a person of ordinary skill in the art would have understood from Ohsaki that a convex protrusion will help prevent slippage, even in the context of Aizawa's sensor. *See* Ex. 1050 ¶¶ 10–11, 24–30. This is because the convex protrusion "promot[es] 'intimate contact with the surface of the user's skin,'" which "would have increased adhesion and reduced slippage of Aizawa's sensor when placed on either side of a user's wrist or forearm, and additionally

would have provided associated improvements in signal quality." *Id.* ¶¶ 29–30 ("additional adhesive effect").

Dr. Madisetti testifies that

> [b]ased on Aizawa's teaching that a flat acrylic plate improves adhesion on the palm side of the wrist, and Ohsaki's teaching that a convex surface tends to slip on the palm side of the wrist, a [person of ordinary skill in the art] would have come to the opposite conclusion from Dr. Kenny: that modifying Aizawa's flat adhesive plate "to include a lens/protrusion . . . similar to Ohsaki's translucent board" would not "improve adhesion."

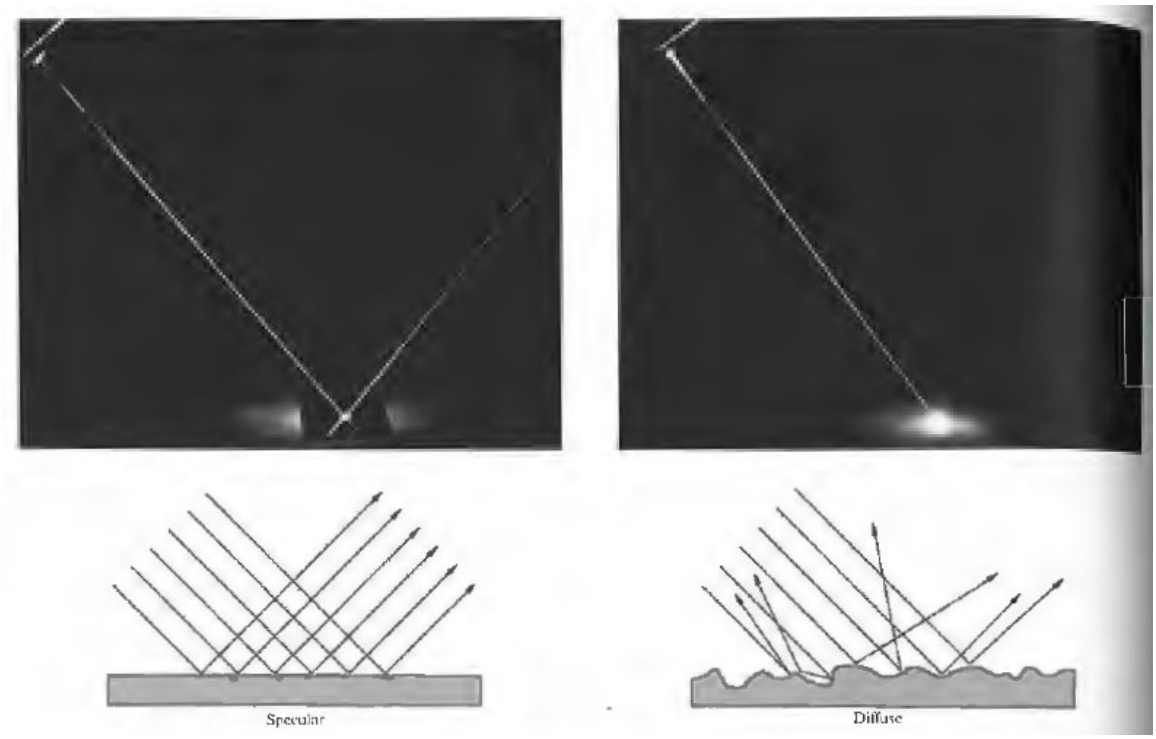
Ex. 2004 ¶ 78 (emphasis omitted); *see also id.* ¶ 76. We disagree with this reading of Aizawa. It is true that Aizawa's plate 6 is illustrated as having a flat surface (Ex. 1006, Fig. 1(b)), and that Aizawa states the plate "improve[s] adhesion" (*id.* ¶ 13). Aizawa further states: "the above belt 7 is fastened such that the acrylic transparent plate 6 becomes close to the artery 11 of the wrist 10," and "[t]hereby, adhesion between the wrist 10 and the pulse rate detector 1 is improved." *Id.* ¶ 26. These disclosures, however, indicate the improved adhesion is provided by the acrylic material of plate 6, not the shape of the surface of the plate, which is never specifically addressed. *See also id.* ¶¶ 30, 34 ("Since the acrylic transparent plate 6 is provided . . . adhesion between the pulse rate detector 1 and the wrist 10 can be improved."). Aizawa does not associate this benefit of improved adhesion with the surface shape of the plate, but rather, with the existence of an acrylic plate to begin with. Thus, there is no teaching away from using a convex surface to improve the adhesion of Aizawa's detector to the user's wrist.

We have considered Patent Owner's third argument that a convex cover would condense light away from Aizawa's peripheral detectors, which Patent Owner alleges would decrease signal strength. PO Resp. 38–44. We disagree.

There appears to be no dispute that when emitted light passes through user tissue, the light diffuses and scatters as it travels. *See, e.g.*, Pet. Reply 29 ("[R]eflectance type pulse detectors detect light that has been 'partially reflected, transmitted, absorbed, and scattered by the skin and other tissues and the blood before it reaches the detector,'" thus, a person of ordinary skill in the art "would have understood from Aizawa's FIG. 1(a) that light that backscatters from the measurement site after diffusing through tissue reaches the circular active detection area provided by Aizawa's detectors from various random directions and angles.") (quoting Ex. 1021, 86); PO Sur-reply 17 ("Even Petitioner admits that tissue randomly scatters and absorbs light rays.").

The light thus travels at random angles and directions, and no longer travels in a collimated and perpendicular manner. Exhibit 1051,[6] Figure 4.12, illustrates the difference between diffuse and collimated light, and is reproduced below:

[6] Eugene Hecht, *Optics* (2nd ed. 1990).



This figure provides at left a photograph and an illustration showing incoming collimated light reflecting from a smooth surface, and at right a photograph and an illustration of incoming collimated light reflecting from a rough surface. *See* Ex. 1051, 87–88 (original page numbers). The smooth surface provides specular reflection, in which the reflected light rays are collimated like the incoming light rays. *See id.* The rough surface provides diffuse reflection, in which the reflected light rays travel in random directions. *See id.*; *see also* Ex. 1050 ¶ 46 ("A [person of ordinary skill in the art] would have understood that light which backscatters from the measurement site after diffusing through tissue reaches the active detection area [provided] from various random directions and angles.").

Dr. Kenny testifies that Aizawa "detect[s] light that has been 'partially reflected, transmitted, absorbed, and scattered by the skin and other tissues and the blood before it reaches the detector.'" Ex. 1050 ¶ 46 (quoting

Ex. 1021, 86). Dr. Kenny further opines that a convex cover, when added to Aizawa's sensor with multiple detectors symmetrically arranged about a central light source, allows light rays that otherwise would have missed the detection area to instead be directed toward that area as they pass through the interface provided by the cover, thus increasing the light-gathering ability of Aizawa's sensor. *Id.* ¶¶ 46–49.

By contrast Dr. Madisetti testifies that "a convex [surface] condenses light passing through it towards the center of the sensor and away from the periphery." Ex. 2004 ¶ 80; *see also id.* ¶¶ 80–82, 86. We have considered this testimony, however, Dr. Madisetti's opinions largely are premised upon the behavior of collimated and perpendicular light as depicted in Figure 14B of the challenged patent. *See id.* ¶ 82. Dr. Madisetti does not explain how light would behave when approaching the sensor from various angles, as it would after being reflected by tissue. *Id.* ¶¶ 84–88. In other words, even if Patent Owner is correct that the '564 patent's Figure 14B depicts light condensing toward the center, this is not dispositive to the proposed modification, because light reflected by a user's tissue is scattered and random, and is not collimated and perpendicular as shown in Figure 14B. Ex. 1001, Fig. 14B.

Patent Owner and Dr. Madisetti argue that "Petitioner and Dr. Kenny both admit that a convex cover condenses light towards the center of the sensor and away from the periphery," in a different petition filed against a related patent, i.e., in IPR2020-01520. PO Resp. 39–41; Ex. 2004 ¶¶ 80–83. The cited portions of the Petition and Dr. Kenny's declaration from IPR2020-01520 discuss a decrease in the "mean path length" of a ray of light when it travels through a convex lens rather than through a flat surface.

See, e.g., Ex. 2020 ¶¶ 118–120. We do not agree that this discussion is inconsistent with Dr. Kenny's testimony here that, where light is reflected to the detectors at various random angles and directions, more light will reach Aizawa's symmetrically disposed detectors when travelling through the convex surface than would be reached without such a surface, because light that might have otherwise missed the detectors now will be captured. *See, e.g.*, Ex. 1050 ¶¶ 49, 55 ("Ohsaki's convex cover provides a slight refracting effect, such that light rays that may have otherwise missed the detection area are instead directed toward that area"). We do not discern that the convergence of a single ray of light toward the center, as discussed in IPR2020-01520, speaks to the aggregate effect on *all* light that travels through the convex surface.

We additionally do not agree with Patent Owner's argument that Petitioner's Reply presents new arguments and evidence that should have been first presented in the Petition, to afford Patent Owner an adequate opportunity to respond. *See* Sur-reply 16–19. The Petition proposed a specific modification of Aizawa to include a convex protrusion in the cover, for the purpose of increasing the light gathering ability of Aizawa's device. *See* Pet. 19–23. The Patent Owner Response then challenged that contention, with several arguments that Petitioner's proposed convex protrusion would not operate in the way the Petition alleges it would operate. *See* PO Resp. 38–44. This opened the door for Petitioner to provide, in the Reply, arguments and evidence attempting to rebut the contentions in the Patent Owner Response. *See* PTAB Consolidated Trial Practice Guide

(Nov. 2019) ("Consolidated Guide"),[7] 73 ("A party also may submit rebuttal evidence in support of its reply."). This is what Petitioner did here. The Reply does not change Petitioner's theory for obviousness; rather, the Reply presents more argument and evidence in support of the same theory for obviousness presented in the Petition. *Compare* Pet. 19–23, *with* Pet. Reply 20–32.

Rationale 3

Petitioner further contends that a person of ordinary skill in the art would have recognized that a cover with a protruding convex surface, such as that taught by Ohsaki, would "protect the elements within the sensor housing" of Aizawa. Pet. 47. We are persuaded that adding a convex cover, such as that taught by Ohsaki, would also protect the sensor's internal components in a manner similar to Aizawa's flat acrylic plate. Ex. 1003 ¶ 70; *see also* Ex. 1008 ¶ 15 (noting that a cover "protect[s] the LED or PD").

We disagree with Patent Owner's fourth argument that a person of ordinary skill in the art would not have modified Aizawa as proposed because a convex cover would be prone to scratches and because other alternatives existed. Patent Owner does not explain how the potential presence of scratches on a convex cover would preclude that cover's ability to, nonetheless, protect the internal sensor components in Aizawa, as Petitioner proposes. That a convex cover may be more prone to scratches than Aizawa's flat cover is one of numerous tradeoffs that a person of ordinary skill in the art would consider in determining whether the benefits

[7] Available at https://www.uspto.gov/TrialPracticeGuideConsolidated.

of increased adhesion, signal strength, and protection outweigh the potential for a scratched cover. *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006). The totality of the final record does not support that the possibility of scratches alone would have dissuaded a person of ordinary skill in the art from the proposed modification, to achieve the benefits identified by Petitioner.

For the foregoing reasons, we are persuaded by Petitioner's contentions.

> *v. "[1d] one or more processors configured to: receive one or more signals from at least one of the at least four detectors, the one or more signals responsive to at least a physiological parameter of the user; and process the one or more signals to determine measurements of the physiological parameter"*

The cited evidence supports Petitioner's undisputed contention that Aizawa discloses one or more processors. Pet. 51–52. According to Petitioner "a [person of ordinary skill in the art] would have understood that Aizawa's drive detection circuit 24 and arithmetic circuit 3 are 'one or more processors' as they receive pulse wave data from the photodetectors and perform signal amplification and calculations to 'comput[e] a pulse rate from the detected pulse wave data.'" *Id.* at 51 (citing Ex. 1006 ¶¶ 23, 28; Ex. 1003 ¶¶ 107–108).[8]

[8] Petitioner further contends that Goldsmith also discloses a processor. Pet. 51–52. Because Aizawa teaches components of a computer system that operate on data, consistent with our construction of the term "processor," further analysis of the combination of Aizawa, Ohsaki, and Goldsmith is not necessary for this particular claim limitation.

vi. "[1e] a network interface configured to communicate with a mobile phone"

The cited evidence supports Petitioner's undisputed contention that Goldsmith discloses a network interface configured to communicate with a mobile phone. Pet. 32–35, 53; *see, e.g.*, Ex. 1011 ¶ 52 ("The communications block 595 may be adapted to provide communication via one or more communications methods, such as RF 596, a USB 597, and IR 598."). In addition, Petitioner provides persuasive reasoning as to why the claimed subject matter would have been obvious to one of ordinary skill in the art. Pet. 35. Petitioner also supports its contentions for this claim with the testimony of Dr. Kenny. Ex. 1003 ¶¶ 55–60, 75–82, 112.

Petitioner further provides persuasive rationales for the combination of certain Goldsmith features with Aizawa and Ohsaki. Pet. 32–41, 35 ("to incorporate the Aizawa-Ohsaki sensor into Goldsmith's WCD such that the sensor would have access to a network interface such as Goldsmith's transceiver or communications block to facilitate remote monitoring, as described in Goldsmith"), 36 ("to incorporate the Aizawa-Ohsaki sensor into Goldsmith's WCD in such a way as to enable measured pulse rate data to be stored in a storage device and retrieved for subsequent use").

Patent Owner does not present any argument other than those we have already considered. PO Resp. 46 ("Petitioner does not argue Goldsmith cures the deficiencies in its proposed combination of Aizawa and Ohsaki.").

vii. "[1f] a touch-screen display configured to provide a user interface"

The cited evidence supports Petitioner's undisputed contention that Goldsmith discloses a touch-screen display configured to provide a user interface. Pet. 27–32, 53; *see, e.g.*, Ex. 1011 ¶ 86 ("[T]he display is a

touchscreen display that may be activated by a user's hand."). In addition, Petitioner provides persuasive reasoning as to why the claimed subject matter would have been obvious to one of ordinary skill in the art. Pet. 29. Petitioner also supports its contentions for this claim with the testimony of Dr. Kenny. Ex. 1003 ¶¶ 59–60, 76–82, 113.

viii. "[1g] wherein the user interface is configured to display indicia responsive to the measurements of the physiological parameter"

The cited evidence supports Petitioner's undisputed contention that Goldsmith discloses the user interface is configured to display indicia responsive to the measurements of the physiological parameter. Pet. 27–32, 53–54. According to Petitioner, Goldsmith's "display 910 displays data directly from the sensor monitors, and data 'received from a sensor transmitter on the patient's skin.'" *Id.* at 53 (citing Ex. 1011 ¶¶ 86–87, 102, Fig. 9A; Ex. 1003 ¶ 115).

ix. "[1h] an orientation of the user interface is configurable responsive to a user input"

The cited evidence supports Petitioner's undisputed contention that Goldsmith discloses an orientation of the user interface is configurable responsive to a user input. Pet. 55–59. According to Petitioner, Goldsmith's "display can be configured in various different ways to allow the interface to be consistent with the user's preferences and to correct the presentation of information that could be incorrect due to the scaling of graphs or incorrect resolutions." *Id.* at 55–56 (citing Ex. 1011 ¶ 49). Petitioner also supports its contentions for this claim with the testimony of Dr. Kenny. Ex. 1003 ¶¶ 118–123.

x. "[1i] a wall that surrounds at least the at least four detectors, wherein the wall operably connects to the substrate and the cover"

The cited evidence supports Petitioner's undisputed contention that Aizawa discloses holder 23, which is a wall that surrounds detectors 22, as well as other elements. Pet. 59–60; *see, e.g.*, Ex. 1006 ¶ 23 ("holder 23 for storing . . . light emitting diode 21 and the photodetectors 22"), Fig. 1(b). The cited evidence also supports Petitioner's undisputed contention that Aizawa's wall "connects to the substrate and the cover." Pet. 60–61 (citing Ex. 1006 ¶¶ 23, 30). Petitioner also supports its contentions for this claim with the testimony of Dr. Kenny. Ex. 1003 ¶¶ 124–125.

xi. "[1j] a storage device configured to at least temporarily store at least the measurements of the physiological parameter"

The cited evidence supports Petitioner's undisputed contention that Goldsmith's device includes a storage device configured to at least temporarily store at least the measurements of the physiological parameter. Pet. 27–32, 61; *see, e.g.*, Ex. 1011 ¶ 95 ("[T]he heart rate or metabolic rate may be correlated to a level of exercise, such as low, medium or high, to store in the controller device memory."). Petitioner also supports its contentions for this claim with the testimony of Dr. Kenny. Ex. 1003 ¶ 126.

xii. "[1k] a strap configured to position the physiological measurement device on the user"

The cited evidence supports Petitioner's undisputed contention that Goldsmith's device includes a strap configured to position the physiological measurement device on the user. Pet. 27–32, 61–63; *see, e.g.*, Ex. 1011 ¶ 85, Figs. 9A, 9B ("[D]evice 900 may include a wrist band 940 so that a user may wear the watch controller device 900 on his/her wrist.").

xiii. Summary

For the foregoing reasons, we determine that Petitioner has met its burden of demonstrating by a preponderance of the evidence that claim 1 would have been obvious over the cited combination of references.

5. Dependent Claims 16 and 17

Dependent claim 16 ultimately depends from independent claim 1 and further recites "the protruding convex surface protrudes a height between 1 millimeter and 3 millimeters." Ex. 1001, 46:26–28.

Dependent claim 17 ultimately depends from independent claim 1 and further recites "the protruding convex surface protrudes a height greater than 2 millimeters and less than 3 millimeters." *Id.* at 46:30–32.

Petitioner contends that the sensor rendered obvious by the combined teachings of Aizawa, Ohsaki, and Goldsmith would have included a cover with a protruding convex surface. *See supra* § II.D.4.iv. With respect to claim 16, Petitioner contends that a person of ordinary skill in the art "would have found it obvious that a device designed to fit on a user's wrist would be on the order of millimeters," consistent with Ohsaki's disclosure that the device is in "intimate contact" with the user's skin. Pet. 77–78 (citing, e.g., Ex. 1003 ¶¶ 146–147). Petitioner also contends that an ordinarily skilled artisan would have taken user comfort into account when establishing the dimensions of the device's convex cover. *Id.* at 78–79. With these considerations in mind, Petitioner contends that, "in order to provide a comfortable cover that prevents slippage, the convex surface should protrude a height between 1 millimeter and 3 millimeters," because "there would have been a finite range of possible protruding heights, and it would have been obvious to select a protruding height that would have been comfortable

to the user." *Id.* at 79 (citing, e.g., Ex. 1003 ¶¶ 147–148). With respect to claim 17, Petitioner incorporates its contentions regarding, *inter alia*, claim 16. Pet. 79; Ex. 1003 ¶ 149.

Patent Owner argues that none of the cited references disclose the claimed height range and that Petitioner relies on hindsight reconstruction. PO Resp. 47–50 (citing, e.g., Ex. 2004 ¶¶ 93–97). Patent Owner also characterizes Dr. Kenny's testimony as conclusory and unsupported. *Id.* at 50–51. Patent Owner also alleges that the benefit "of reducing the main optical path lengths" is achieved at these dimensions. Tr. 31:8–15.

Petitioner is correct that, "[w]hen there . . . are a finite number of identified, predictable solutions, a person of ordinary skill [in the art] has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product . . . of ordinary skill and common sense." *KSR*, 550 U.S. at 421. Petitioner has shown sufficiently that only a finite number of solutions existed with respect to the height of a convex protrusion on a tissue-facing sensor, which would have met the art-recognized goals of both (1) intimate contact between the sensor's surface and the user and (2) user comfort. *See, e.g.*, Ex. 1009 ¶¶ 6, 25. Bearing in mind these considerations, we credit Dr. Kenny's testimony that it would have been obvious, "in order to provide a comfortable cover that prevents slippage, [that] the convex surface should protrude a height between 1 millimeter and 3 millimeters," as recited in claim 16, and which further includes the claimed range of 2 to 3 millimeters as recited in claim 17. Ex. 1003 ¶ 148. Further, the record does not support that any new and unexpected results were achieved at the claimed height greater than 2 millimeters and less than 3 millimeters. *See, e.g.*, Ex. 1001, 23:43–50 ("The

height 430 can be from about 0.5 millimeters to about 3 millimeters, e.g., about 2 millimeters. In an embodiment, the dimensions 400, 410, and 430 can be selected such that the measurement site contact area 470 includes an area of about 80 square millimeters, although larger and smaller areas can be used for different sized tissue for an adult, an adolescent, or infant, or for other considerations.").

We have considered Patent Owner's argument, and Dr. Madisetti's cited testimony. However, it is not dispositive that none of Aizawa, Ohsaki, or Goldsmith teaches the claimed range. PO Resp. 48–50; Ex. 2004 ¶¶ 95–97. Petitioner relies upon the knowledge, ability, and creativity of a person of ordinary skill in the art, not the teachings of a specific reference. Notably, Dr. Madisetti does not dispute Dr. Kenny's position that there were a finite number of options available for the height of the convex surface. Ex. 2004 ¶¶ 95–98. Therefore, we do not agree that Petitioner's contentions are rooted in impermissible hindsight. *See, e.g.*, *In re McLaughlin*, 443 F.2d 1392, 1395 (CCPA 1971) ("Any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning, but so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made and does not include knowledge gleaned only from applicant's disclosure, such a reconstruction is proper."). As for the alleged benefit at the specific ranges described in the Specification, we agree with Petitioner that other considerations are relevant, such as user comfort and other attributes, that would have motivated a person of ordinary skill in the art to design within the claimed ranges. *See* Tr. 80:7–14; Ex. 1001, 23:43–50.

Accordingly, for the foregoing reasons, we determine that Petitioner has met its burden of demonstrating by a preponderance of the evidence that claims 16 and 17 would have been obvious over the cited combination of references.

6. Dependent Claims 2–10, 13–15, and 18–30

Petitioner also contends that claims 2–10, 13–15, and 18–30 would have been obvious based on the same combination of prior art addressed above. These challenged claims all depend directly or indirectly from independent claim 1. Petitioner identifies teachings in the prior art references that teach the limitations of these claims, and provides persuasive reasoning as to why the claimed subject matter would have been obvious to one of ordinary skill in the art. Pet. 64–77, 80–91. Petitioner also supports its contentions for these claims with the testimony of Dr. Kenny. Ex. 1003 ¶¶ 129–145, 150–170.

Patent Owner does not present any arguments for these claims other than those we have already considered with respect to independent claim 1. PO Resp. 46–47 ("[T]he Petition fails to establish that independent claim 1 is obvious in view of the cited references of Ground 1 and therefore fails to establish obviousness of any of the challenged dependent claims.").

We have considered the evidence and arguments of record and determine that Petitioner has demonstrated by a preponderance of the evidence that claims 2–10, 13–15, and 18–30 would have been obvious over the combined teachings of Aizawa, Ohsaki, and Goldsmith for the reasons discussed in the Petition and as supported by the testimony of Dr. Kenny.

For the foregoing reasons, we determine that Petitioner has met its burden of demonstrating by a preponderance of the evidence that claims 1–10 and 13–30 would have been obvious over the cited combination of references.

E. Obviousness over the Combined Teachings of Aizawa, Ohsaki, Goldsmith, and Sherman

Petitioner contends that claim 11 of the '564 patent would have been obvious over the combined teachings of Aizawa, Ohsaki, Goldsmith, and Sherman. Pet. 91–95; *see also* Pet. Reply 37–40. Patent Owner disagrees. PO Resp. 51–52; *see also* Sur-reply 27–28.

Based on our review of the parties' arguments and the cited evidence of record, we determine that Petitioner has met its burden of showing by a preponderance of the evidence that claim 11 is unpatentable.

1. Sherman (Ex. 1013)

Sherman is a patent titled "Magnetic Clasp for Wristwatch Strap," and it relates to use of magnetizable material embedded in thermoplastic material with rows of alternating magnetic poles. Ex. 1013, codes (54), (57). Sherman discloses a magnetic fastening mechanism for "wrist instruments," such as wristwatches. *Id.* at 1:4–10. Sherman's system provides "an improved clasp for a flexible strap which eliminates buckles or other types of protruding mechanisms" and is "secured, yet easy to engage when desired." *Id*. at 2:1–11. As shown below in Figure 2 of Sherman, the mechanism includes a pair of flexible strap ends having "permanently magnetizable material" of opposite polarities in addition to "mutually nesting uniformly spaced protuberances and indentations." *Id*. at 2:43–62, Fig. 2.

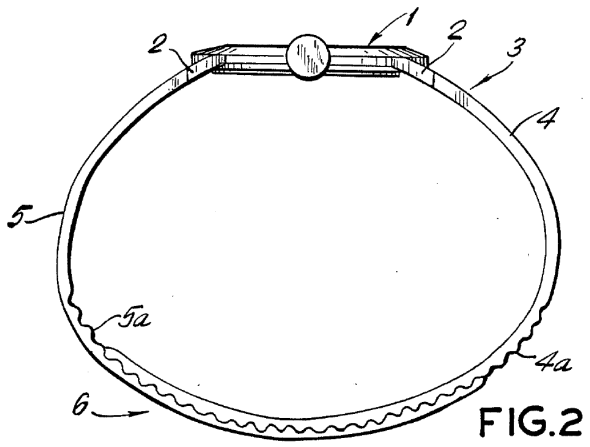


FIG.2

Figure 2 of Sherman depicts an end elevational view showing the wristwatch and strap with transverse ridges 4a and 5a incorporating magnetic securing materials. *Id.*

2. Dependent Claim 11

Claim 11 additionally requires "a magnet configured to be used as a connecting mechanism." Ex. 1001, 46:8–9. Petitioner contends that it would have been obvious for a person of ordinary skill in the art to have modified the sensor system of Aizawa-Ohsaki-Goldsmith to integrate a magnetic connection as taught by Sherman. Pet. 93–95.

Petitioner's Contentions

Petitioner contends that although Goldsmith generally discloses a fastener, Goldsmith "provides no details describing the fastener," but that a person of ordinary skill in the art "would have been motivated to look to other wearable, wrist worn devices such as Sherman's, for details regarding a mechanism for fastening a monitoring device." Pet. 93 (citing Ex. 1003 ¶ 171). Petitioner contends a person of ordinary skill in the art would have been motivated to add Sherman's magnetic connection in order to be more

visually appealing, prevent corners from catching upon clothing, and to prevent broken connectors or accidental snagging. *Id.* (citing Ex. 1013, 1:11–24; Ex. 1003 ¶ 171).

Patent Owner's Contentions

Patent Owner disputes Petitioner's contentions. Patent Owner argues that Petitioner's proposed combination relies on Sherman solely for its alleged disclosure of a magnetic connector, but Ohsaki already includes a series of dedicated belts designed to exert a specific pressure on the user's wrist. PO Resp. 51 (citing Ex. 1009 ¶ 18). Patent Owner alleges that a person of ordinary skill in the art would have understood that any advantage from Ohsaki's convex board would also require Ohsaki's specific attachment arrangement, which includes belts and a cushion to prevent movement, yet, Petitioner does not explain how Sherman would have allowed consistent attachment pressure for its sensor as required by Ohsaki. *Id.* at 52 (citing Ex. 1009 ¶ 18); *see also* Sur-reply 27 ("Ohsaki uses specific dedicated belts to keep sensor body, detecting element, and cushion aligned."). Thus, Patent Owner contends that the person of ordinary skill in the art "would not have been motivated to incorporate Sherman's magnetic attachment mechanism into Petitioner's proposed combination." PO Resp. 52 (citing Ex. 2004 ¶ 101); *see also* Sur-reply 27–28.

Analysis

We are persuaded by Petitioner's evidence and argument that a person of ordinary skill in the art would have been motivated to combine Sherman's teaching of a magnetic connection in the existing combination of references. We find persuasive Dr. Kenny's testimony that a person of ordinary skill in

the art would have understood from Ohsaki itself that a cushion designed to exert a specific pressure is not required to obtain the benefits described in relation to Ohsaki's board. Ex. 1050 ¶¶ 67–69 (noting that Ohsaki's cushion is on the back side whereas the modified connection "would be on the front side") (citing Ex. 1009, Fig. 1). Further, we are persuaded by Dr. Kenny's testimony that "[t]he combination involves nothing more than applying a known technique to fasten two ends of a strap for attaching a wrist worn device to a user's arm." Ex. 1003 ¶ 174. In light of the totality of the record, including Dr. Kenny's testimony, we determine that a person of ordinary skill in the art would have been motivated to employ Sherman's magnetic connector because the pressure range required for Ohsaki's benefits could be achieved by any number of connection fastening mechanisms.

Further, Patent Owner's arguments do not persuasively address Petitioner's proposed combination. *See* Pet. 19–23, 91–95. Ohsaki was relied upon for its teaching that a convex surface protruding into a user's skin will, *inter alia*, prevent slippage. *See id.*; *see also* Ex. 1050 ¶ 73; Ex. 1009, 25, Figs. 4A, 4B. As discussed above, we found persuasive Dr. Kenny's testimony that a person of ordinary skill in the art would have had reason, in view of that teaching, to modify the Aizawa's sensor's flat cover to include a protrusion, so as to improve adhesion between the user's wrist and the sensor's surface, improve detection efficiency, and protect the elements within the sensor housing. *See* Ex. 1003 ¶¶ 103–106. The resulting sensor features Aizawa's cover modified in view of Ohsaki, but does not include Ohsaki's belt connector. Ex. 1050 ¶ 7. Likewise, Patent Owner does not effectively rebut Dr. Kenny's testimony that a person of

ordinary skill in the art would have integrated a magnetic connector in the combination of references in view of Sherman for reasons related to engagement and user comfort. *See* PO Resp. 51–52; Ex. 1003 ¶¶ 173–174 ("because it provided details of a wrist-worn device fastening mechanism that addresses the above-noted problems, is easy to engage, and improves user comfort"); Ex. 1050 ¶¶ 68–69.

3. Conclusion

For the foregoing reasons, we determine that Petitioner has met its burden of demonstrating by a preponderance of the evidence that claim 11 would have been obvious over the cited combination of references.

F. Obviousness over the Combined Teachings of Aizawa, Ohsaki, Goldsmith, and Rantala

Petitioner contends that claim 12 of the '564 patent would have been obvious over the combined teachings of Aizawa, Ohsaki, Goldsmith, and Rantala. Pet. 95–99; *see also* Pet. Reply 40. Patent Owner disagrees. PO Resp. 51–52;[9] *see also* Sur-reply 28.

Based on our review of the parties' arguments and the cited evidence of record, we determine that Petitioner has met its burden of showing by a preponderance of the evidence that claim 12 is unpatentable.

1. Rantala (Exhibit 1022)

Rantala is a patent titled "Pulse Oximeter," and it relates to minimizing the power consumption in a pulse oximeter without

[9] Although Patent Owner's heading lists Grounds 2 and 3, Patent Owner only discusses ground 2.

compromising on performance. Ex. 1022, codes (54), (57). Figure 1 of Rantala is reproduced below.

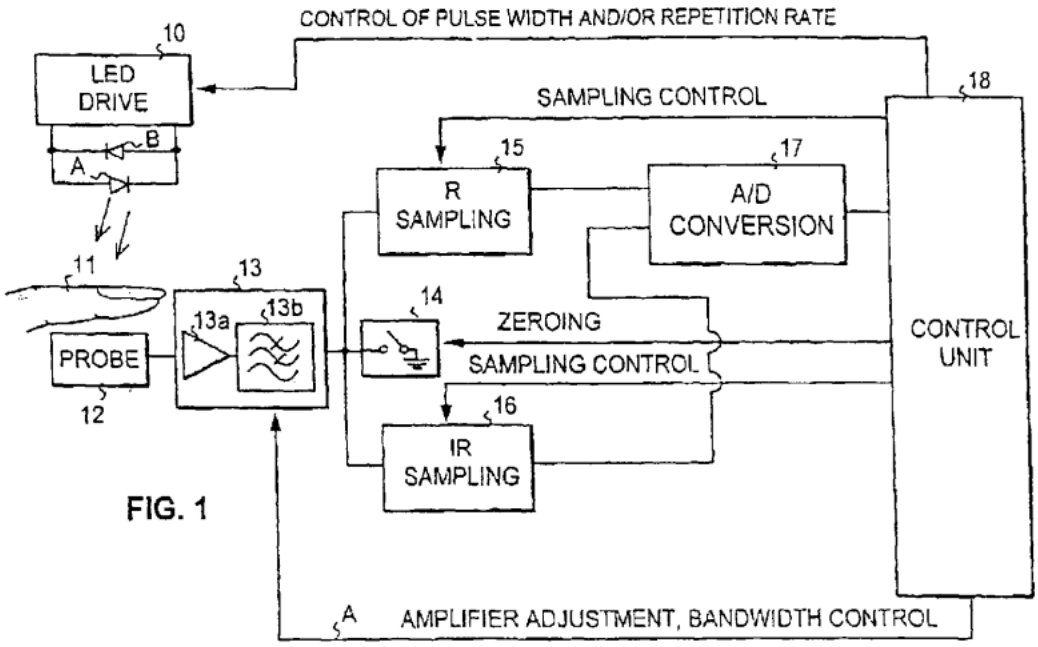


FIG. 1

Figure 1 illustrates an exemplary pulse oximeter. *Id.* at 4:26–27. As depicted in Figure 1, Rantala's pulse oximeter includes a control unit 18 connected to a LED Drive 10 that drives LEDs A and B to emit light at different wavelengths. *Id.* at 4:47–5:13. Rantala explains that to optimize and minimize power consumption in the pulse oximeter, control unit 18 changes at least one parameter, such as the pulse width, pulse repetition rate, and pulse amplitude, of the duty cycle of the pulse train driving the LEDs. *Id.* at 5:13–36. Exemplary pulse trains generated by the control unit are shown in Rantala's Figures 3a and 4a, reproduced below.

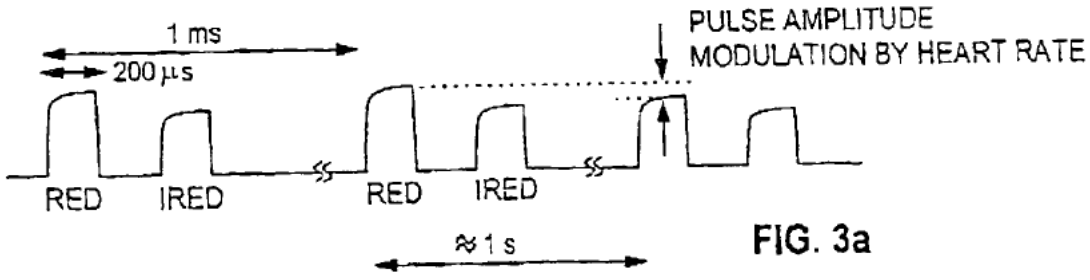


FIG. 3a

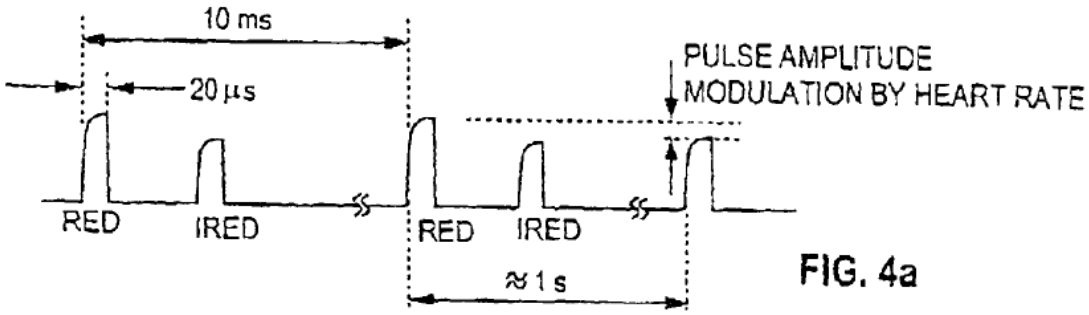


FIG. 4a

Figure 3a (top) "illustrates the timing sequence of the detector signal when a high duty cycle pulse sequence is used," and Figure 4a (bottom) illustrates "the timing sequence of the detector signal when a low duty cycle pulse sequence is used." *Id.* at 4:31–32, 38–39. Exemplary pulse trains generated by the control unit and depicted in Rantala's Figures 3a and 4a show the pulse width of the pulse train in Figure 4a being narrower than the pulse width of the pulse train in Figure 3a. *Id.* at 6:20–56.

2. Dependent Claim 12

Claim 12 additionally requires "the one or more processors are further configured to modulate a duty cycle of one or more of the one or more emitters, and wherein the modulation includes pulse width time slots and off time slots." Ex. 1001, 46:11–14. Petitioner contends that it would have been obvious for a person of ordinary skill in the art to have modified the

processors of Aizawa-Ohsaki-Goldsmith to modulate a duty cycle of one or more of the one or more emitters as taught by Sherman. Pet. 95–99.

The cited evidence supports Petitioner's undisputed contention that Rantala's device includes one or more processors are further configured to modulate a duty cycle of one or more of the one or more emitters, and wherein the modulation includes pulse width time slots and off time slots. Pet. 95–99; *see, e.g.*, Ex. 1022, 6:22–29 ("The power control scheme of the present invention uses a high duty cycle pulse train only when the desired signal-to-noise ratio cannot otherwise be reached, i.e. the situation of [Figures] 3a to 3d" or "in [Figures] 4a to 4d the pulse oximeter is a narrow pulse oximeter where the LEDs are activated as briefly as possible in order to save power."). Petitioner also supports its contentions for this claim with the testimony of Dr. Kenny. Ex. 1003 ¶¶ 64, 176–179.

For the foregoing reasons, we determine that Petitioner has met its burden of demonstrating by a preponderance of the evidence that claim 12 would have been obvious over the cited combination of references.

G. Obviousness over the Combined Teachings of Aizawa, Ohsaki, Goldsmith, and Ali

Petitioner challenges the patentability of claims 1–10 and 13–30 based on the combination of Aizawa, Ohsaki, Goldsmith, and Ali. Pet. 9, 99–102. Ali is relied upon to teach limitation [1h] which reads: "an orientation of the user interface is configurable responsive to a user input." Petitioner contends that remaining claim limitations [1a]–[1g] and [1i]–[1k] are unpatentable for the same reasons raised with respect to the challenge of claim 1 based on the combination of Aizawa, Ohsaki, and Goldsmith.

Pet. 99 ("Prior art mappings and arguments for all claim features other than [1h] in Ground 4 are the same as in Ground 1.").

1. Overview of Ali

Ali is a U.S. patent titled "Universal/Upgrading Pulse Oximeter," and discloses a portable pulse oximeter unit for measuring a patient's oxygen saturation or other related physiological parameters. Ex. 1019, codes (54), (57). The portable unit includes a display configured to display an image that is "rotatable, either manually . . . or as a function of orientation." *Id.* at code (57). Figures 8B and 8C of Ali are reproduced below.

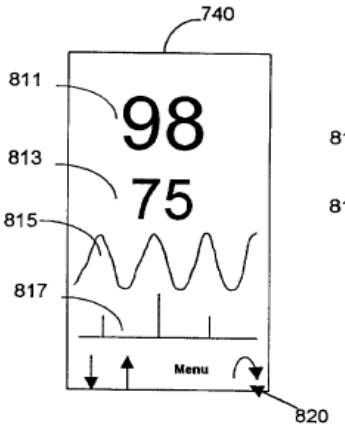


FIG. 8B

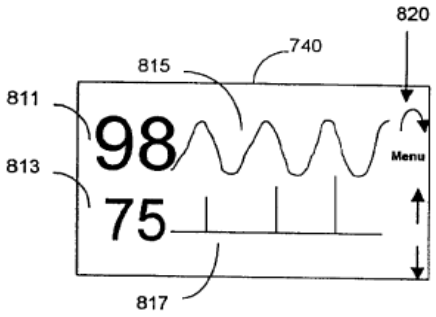


FIG. 8C

Figure 8B (left) depicts the display of the portable pulse oximeter in portrait mode, and Figure 8C (right) depicts the display of the portable oximeter in landscape mode. *Id.* at 11:62–64. The portrait mode and landscape mode are determined by a gravity-activated tilt sensor or a display mode key. *Id.* at 11:64–12:7.

2. Independent Claim 1 (Aizawa, Ohsaki, Goldsmith, and Ali)

Petitioner presents undisputed contentions that claim 1 would have been obvious over the combined teachings of Aizawa, Ohsaki, Goldsmith, and Ali. Pet. 99–102.

For this Ground, Patent Owner does not present any argument other than those we have already considered above with respect to the Ground based on Aizawa, Ohsaki, and Goldsmith. PO Resp. 52–53 ("Petitioner does not rely on Ali to fix the deficiencies in Ground 1. The Board should thus reject Ground 4 for the same reasons as Ground 1.").

i. [1a]–[1g] and [1i]–[1k]

The cited evidence supports Petitioner's contentions regarding these limitations. Pet. 41–54, 59–63.

Petitioner contends claim limitations [1a]–[1g] and [1i]–[1k] are unpatentable for the same reasons raised with respect to Petitioner's challenge based on Aizawa, Ohsaki, and Goldsmith. Pet. 99. The ground based on Aizawa, Ohsaki, and Goldsmith is addressed *supra* at §§ (II)(D)(4)(i)–(xii). For the reasons discussed in these sections, Petitioner's stated reasoning with respect to these limitations, and the basis for combining Aizawa, Ohsaki, and Goldsmith, is sufficiently supported, including by the testimony of Dr. Kenny.

ii. "[h] an orientation of the user interface is configurable responsive to a user input"

The cited evidence supports Petitioner's undisputed contentions regarding this limitation and the rationale for combining Ali with Aizawa, Ohsaki, and Goldsmith. Pet. 99–102.

As noted in our analysis above, Petitioner proposes integrating the pulse wave sensor of Aizawa (as modified by Ohsaki) into the watch controller device of Goldsmith, so that the modified sensor can transmit data to Goldsmith's touchscreen. Pet. 41. Goldsmith notes a problem in displaying images as a result of the display of a controller device and infusion pump having two different resolutions. Ex. 1011 ¶ 49. Acknowledging the image display problem described in Goldsmith, Petitioner contends images displayed on the touchscreen user interface of the pulse wave sensor of Aizawa (as modified by Ohsaki and Goldsmith) "can be incorrect due to screen formatting, scaling, and resolution issues." Pet. 101 (citing Ex. 1011 ¶ 49). Goldsmith further discloses that its display is customizable with different backgrounds, fonts, wallpapers, or font sizes. Ex. 1011 ¶¶ 102, 104.

Figures 8B and 8C of Ali disclose a portable pulse oximeter that displays images, such as pulse rate data, in portrait mode or alternatively in landscape mode. Ex. 1019, 11:62–64, 12:8–12. Petitioner contends "to address problems in displaying graphs and text as described in Goldsmith, a POSITA would have included Ali's capability to select user interface orientation through a user input such that the user may have greater control over the display and enjoy an improved viewing experience." Pet. 101–102. Dr. Kenny testifies:

> Implementing Ali's capability to select user interface orientation in [Aizawa, Ohsaki, and Goldsmith's physiological measurement device] would have been predictable at least because it would have involved incorporating a feature that was simple to implement and known in the industry. For instance, Ali concedes that its user interface orientation selection feature can easily be implemented through a software program for

> modifying the display of information. . . . Furthermore, this combination would have addressed a known issue in Goldsmith's user interface, and would require nothing more than applying a known technique, as described by Ali.

Ex. 1003 ¶ 184; *also see* Pet. 102 (citing Ex. 1003).

Petitioner's stated reasoning is sufficiently supported, including by the unrebutted testimony of Dr. Kenny.

iii. Summary

We have considered the evidence and arguments of record, including those directed to ground 1 addressed above, and we determine that Petitioner has demonstrated by a preponderance of the evidence that claim 12 would have been obvious over the combined teachings of Aizawa, Ohsaki, Goldsmith, and Ali for the reasons discussed in the Petition and as supported by the testimony of Dr. Kenny.

3. Dependent Claims 2–10 and 13–30

Petitioner also contends that claims 2–10 and 13–30 would have been obvious based on the same combination of prior art addressed above. These challenged claims all depend directly or indirectly from independent claim 1. Petitioner identifies teachings in the prior art references that teach the limitations of these claims, and provides persuasive reasoning as to why the claimed subject matter would have been obvious to one of ordinary skill in the art. Pet. 99–102. Petitioner also supports its contentions for these claims with the testimony of Dr. Kenny. Ex. 1003 ¶¶ 180–184.

Patent Owner does not present any arguments for these claims other than those we have already considered with respect to independent claim 1. PO Resp. 52–53 ("Petitioner does not rely on Ali to fix the deficiencies in

Ground 1. The Board should thus reject Ground 4 for the same reasons as Ground 1.").

We have considered the evidence and arguments of record and determine that Petitioner has demonstrated by a preponderance of the evidence that claims 2–10 and 13–30 would have been obvious over the combined teachings of Aizawa, Ohsaki, Goldsmith, and Ali for the reasons discussed in the Petition and as supported by the testimony of Dr. Kenny.

For the foregoing reasons, we determine that Petitioner has met its burden of demonstrating by a preponderance of the evidence that claims 1–10 and 13–30 would have been obvious over the cited combination of references.

H. Obviousness over the Combined Teachings of Aizawa, Ohsaki, Goldsmith, Ali, and Sherman

Petitioner presents undisputed contentions that claim 11 would have been obvious over the combined teachings of Aizawa, Ohsaki, Goldsmith, Ali, and Sherman. Pet. 102–103.

Patent Owner does not present any argument for claim 11 other than those we have already considered above with respect to the Ground based on Aizawa, Ohsaki, and Goldsmith. PO Resp. 53 ("Grounds 5[–]6 only address dependent claims and do not fix the deficiencies in Ground 4. The Board should thus reject Grounds 5[–]6 for the same reasons as Ground 1.").

For the reasons discussed above in § II.E, Petitioner identifies teachings in the prior art references that teach or suggest the limitations of claim 11, and provides persuasive reasoning as to why the claimed subject matter would have been obvious to one of ordinary skill in the art. Petitioner also supports its contentions for this claim with the testimony of Dr. Kenny.

Ex. 1003 ¶¶ 185–186. For the same reasons, and having considered the evidence and arguments of record, including those directed to claim 1 and addressed above, we determine that Petitioner has demonstrated by a preponderance of the evidence that claim 11 would have been obvious over the combined teachings of Aizawa, Ohsaki, Goldsmith, Ali, and Sherman for the reasons discussed in the Petition and as supported by the testimony of Dr. Kenny. *See, e.g.*, Ex. 1013, 1:4–24; Ex. 1003 ¶¶ 171–174, 185–186.

I. Obviousness over the Combined Teachings of Aizawa, Ohsaki, Goldsmith, Ali, and Rantala

Petitioner presents undisputed contentions that claim 12 would have been obvious over the combined teachings of Aizawa, Ohsaki, Goldsmith, Ali, and Rantala. Pet. 102–103.

Patent Owner does not present any argument for claim 12 other than those we have already considered with respect to claim 1. PO Resp. 53 ("Grounds 5[–]6 only address dependent claims and do not fix the deficiencies in Ground 4. The Board should thus reject Grounds 5[–]6 for the same reasons as Ground 1.").

For the reasons discussed above in § II.F, Petitioner identifies teachings in the prior art references that teach or suggest the limitations of claim 12, and provides persuasive reasoning as to why the claimed subject matter would have been obvious to one of ordinary skill in the art. Petitioner also supports its contentions for this claim with the testimony of Dr. Kenny. Ex. 1003 ¶¶ 185–186. For the same reasons, and having considered the evidence and arguments of record, including those directed to claim 1 and addressed above, we determine that Petitioner has demonstrated by a preponderance of the evidence that claim 12 would have been obvious over

the combined teachings of Aizawa, Ohsaki, Goldsmith, Ali, and Rantala for the reasons discussed in the Petition and as supported by the testimony of Dr. Kenny. *See, e.g.*, Ex. 1022, 6:22–29; Ex. 1003 ¶¶ 176–179, 185–186.

III. CONCLUSION

In summary:[10]

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–10, 13–30	103	Aizawa, Ohsaki, Goldsmith	1–10, 13–30	
11	103	Aizawa, Ohsaki, Goldsmith, Sherman	11	
12	103	Aizawa, Ohsaki, Goldsmith, Rantala	12	
1–10, 13–30	103	Aizawa, Ohsaki, Goldsmith, Ali	1–10, 13–30	
11	103	Aizawa, Ohsaki, Goldsmith, Ali, Sherman	11	
12	103	Aizawa, Ohsaki, Goldsmith, Ali, Rantala	12	
Overall Outcome			1–30	

[10] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. *See* 84 Fed. Reg. 16654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

ORDER

Upon consideration of the record before us, it is:

ORDERED that claims 1–30 of the ’564 patent have been shown to be unpatentable;

FURTHER ORDERED that, because this is a final written decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

IPR2020-01713
Patent 10,624,564 B1

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CERTIFICATE OF SERVICE

I hereby certify that the original of this Notice of Appeal was filed via U.S.P.S. Priority Mail Express on June 28, 2022 with the Director of the United States Patent and Trademark Office at the address below:

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A copy of this Notice of Appeal is being filed and served on June 28, 2022 as follows:

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